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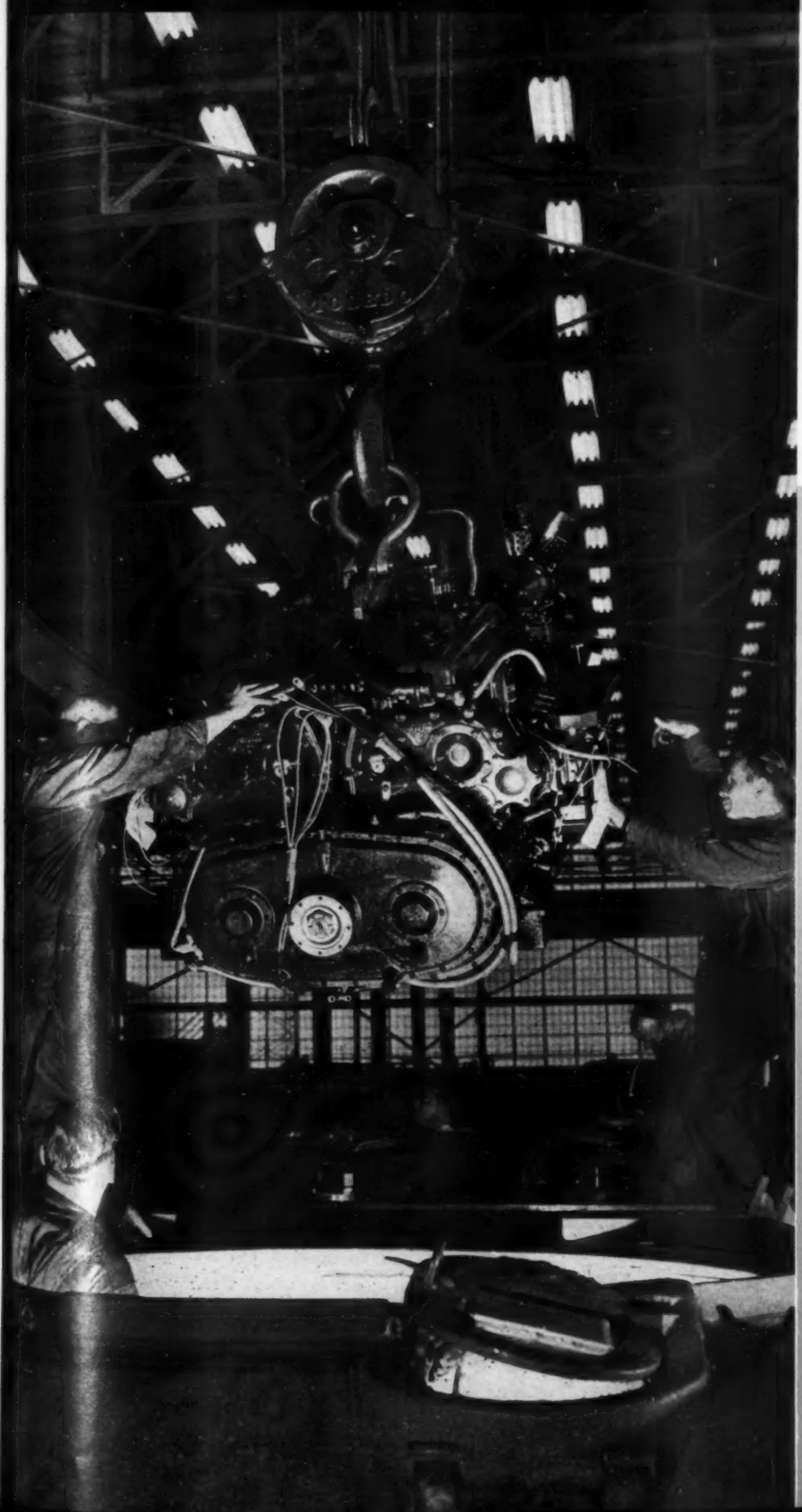
DIESEL PROGRESS, for October, 1943. Volume IX, Number 10. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 W. Forty-fifth St., New York 19, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1943, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: $5.00 per year, single copy, 50c.

DIESEL and GAS ENGINE PROGRESS



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FRONT COVER ILLUSTRATION: Dirty weather sweeps the fo'castle head of a U. S. Destroyer on convoy escort in the North Atlantic. Official U. S. Navy photograph.

TABLE OF CONTENTS ILLUSTRATION: A General Motors Diesel engine, product of Detroit Diesel Division, being lowered into an M-4 tank in a Fisher Body plant.

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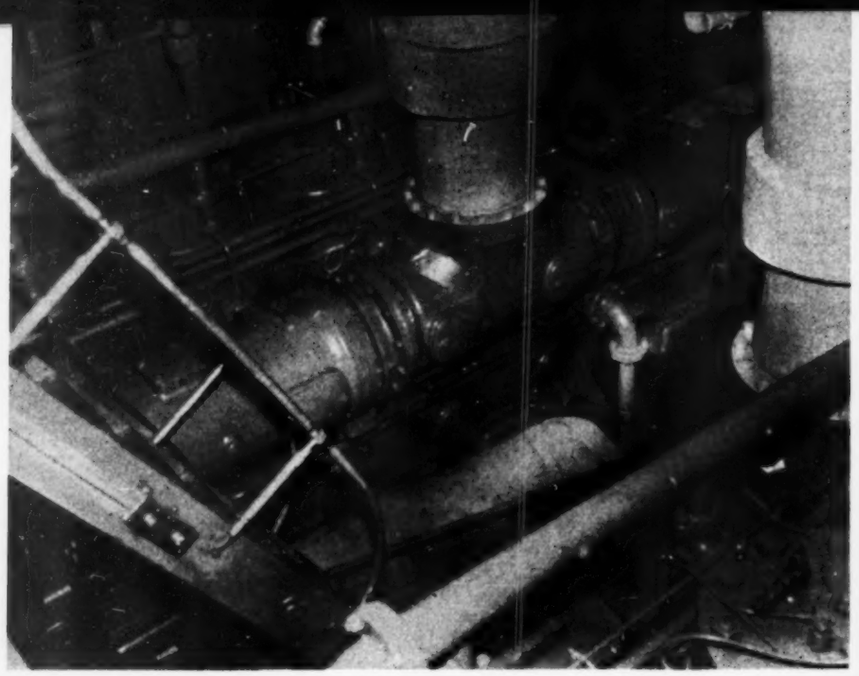
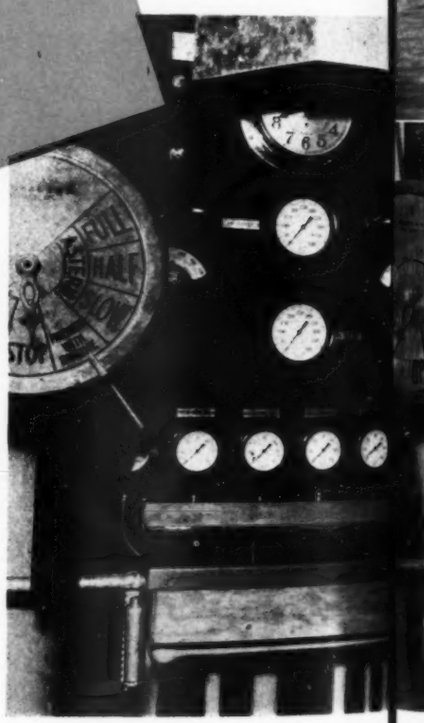


Tops of the two Fairbanks-Morse main Diesels on the L-T115 are all the photographers could catch in the well-filled engine room.

Left to right: Albert Schaf president, Ed. Lundgren, v president, and Ray Purkey, sec treas'r of Grays Harbor Sh building Corp.

GRAYS HARBOR DELIVERS FIRST "L-T" TO THE ARMY



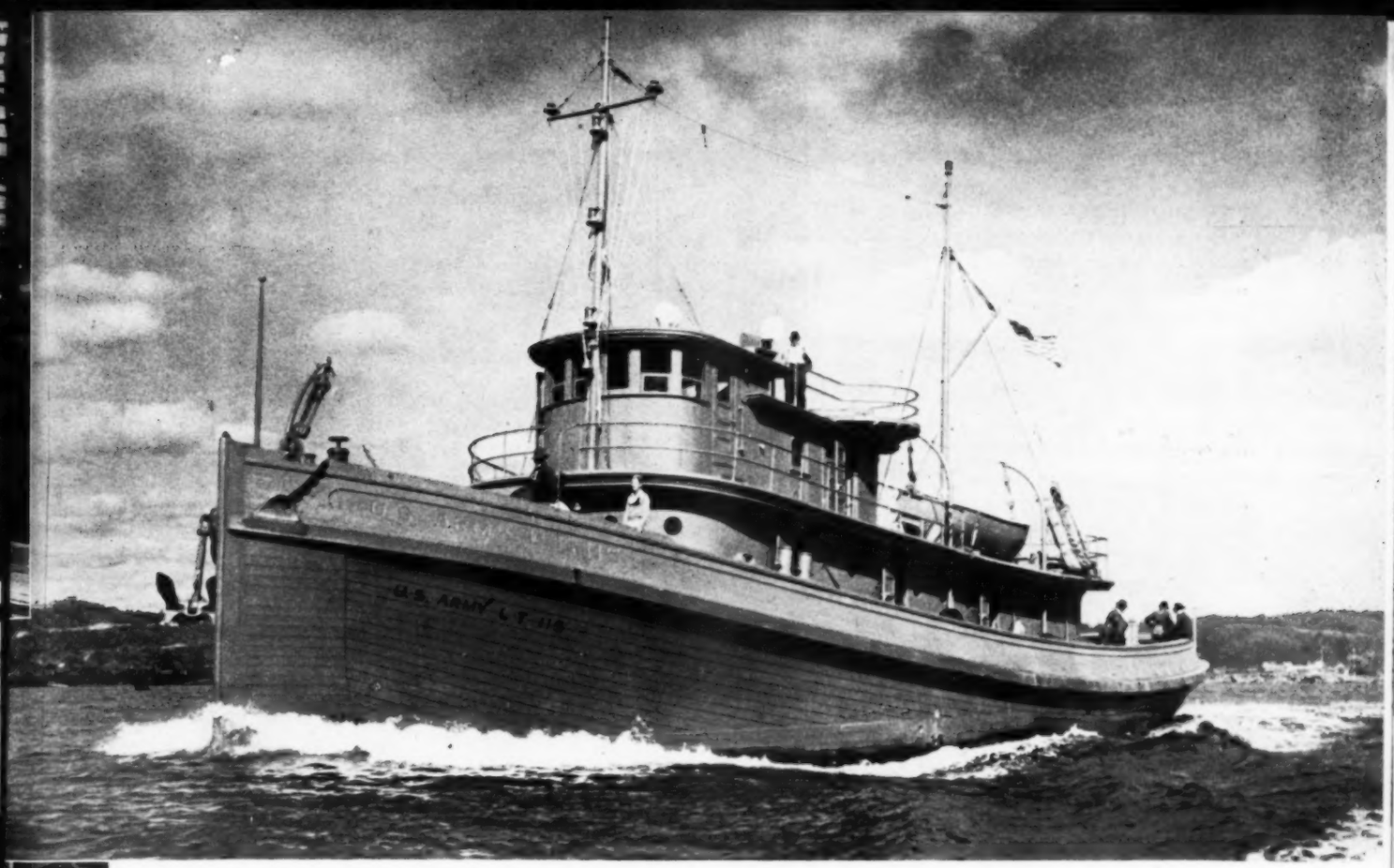
By CHARLES F. A. MANN

KNOWN to three generations of shipping men and waterfronters as the No. 1 home of America's biggest of its Big Timber industry, Grays Harbor, Washington, has been busy for the past 60 years cutting the largest stands of big trees ever known in America.

But it remained for World War II to come along to give Wood & Diesel shipbuilding a real start out there by the Pacific, where they have only one kind of climate—a continuous cycle the year round of warm, soaking rainfall, interspersed with warm, windless sunshine, a cycle of gentle climatic monotony found only in the tropics or South Florida, but because of its coolness, and astonishingly low daily relative humidity—S'the plain truth—Grays Harbor will probably be in full agreement with this story, for a hundred miles away in Seattle, they think of the Harbor yards as self-reliant, enterprising and requiring practically no watching to produce an astonishing quota of new tonnage to help them move troops and supplies to the far corners of the world.

Largest of four yards is Grays Harbor Shipbuilding Corporation, headed by one of the most enterprising, lovable pioneer timber men in the whole Northwest, Mr. Albert Schafer, and two faithful associates of long standing in the numerous Harbor industries sponsored by the Brothers Schafer over a period of 52 consecutive years. They are Mr. Ed. Lundgren, Vice President, and Ray Purkey, Secretary-Treasurer.

After a lifetime as a logger, sawmiller, plywood and door manufacturer, Mr. Schafer calmly decided to convert a huge, level, former Saw- mill site he owned, into a sprawling, mass- production wood shipyard, to be run by Mr. Lundgren as if he were the sole owner, and to turn the splendid Harbor resources of timber and fine Scandanavian labor, both resources



The L-T115 on trial run, Grays Harbor, Washington.

Engine control stand showing engine room telegraphs, gauges and pair of Weston tachometers.

and men being synonomous with the community since its founding, into ships for the winning of World War II.

Most men with the background of Mr. Schafer, would have retired a dozen years ago, and let younger men wrangle in this strange new world of high wages, priorities, renegotiation, etc.

But not this fellow. A lifetime spent in running steam logging machinery and steam sawmills, he couldn't resist the temptation to turn his remarkable energies into production of complicated Wood & Diesel tugs for the Army, and round out a career that spans, actually, the whole commercial lifetime of the cities of Aberdeen and Hoquiam.

World War I saw Grays Harbor the focal point of a wild and woolly radical Labor gang, and the nest of much IWW-ism and sundry imported South European Isms that frightened less stable leaders out of their wits.

Today, 25 years later, Grays Harbor is the ONE WHITE LABOR SPOT ON THE WHOLE PACIFIC COAST, and, strangely, it recently became equipped with a Republican Congressman; shied away from foolish rationing, Housing Authorities, Federally sponsored Red-Tape machinery, etc., and to the amazement of all visitors, rents, wages, prices and the supply of food and merchandise in the whole area, is in perfect stability, and outsiders can actually buy a fifty cent course dinner without furtively looking around to see who might be watching them!

By the time this article is in print, Grays Harbor Shipbuilding will have completed launching ten hulls—5 single screw and 5 twin screw 127 ft. L.T. type, and delivery day will be at hand for all of them on rapid schedule. A trio of huge 203 ft. 3,000 ton capacity wooden barges of the type designed to be towed by the tugs, will have been finished too.

The layout of the yard permits high-speed mass production and the mold loft is the largest of any wooden shipbuilding yard in the Northwest. The outfitting warehouse and dock is located at the remote north end of the plant, clear of the huge fabricating shed and covered launching ways, and with separate receival arrangements and roadways for outfitting supplies.

The plant, located a stone's throw from the South end of Aberdeen's main business district, is accessible to rail and main highway transport, and fronts on the main channel of the Chehalis River just above where it enters Grays Harbor proper.

First of the fleet of tugs was completed early in September, the U. S. Army L-T 115, a huge,

solid Wood and Diesel job designed to take the pounding of long runs offshore, with long gaps between refuelling. This type is 126.6 x 28 x 16 ft. and has a gross displacement of about 650 tons, being heavily loaded down with special equipment, extra large tank capacity and of the heaviest hull construction yet called for by the United States Army.

The double 7 x 14 in. fir framing, built up douglas fir keel, 4 x 8 in. outer planking and use of Alaska cedar framing above the waterline and iron bark sheathing on the hull for above and below the waterline, permits these tugs to take the pounding of landings in bases exposed to rough sea and long grinds in Northern waters where floating ice can splinter a wood hull in no time.

The tug has a capacity of 30,000 gallons of fuel, 875 gallons of lube oil and 3200 gallons of fresh water fore and aft of the engine space, and crews quarters for 12 in the focsle. All main propulsion and auxiilary machinery is in careful duplicate and the entire ship is inter-accessible from the inside so that she may be shut up tight in a storm, assuring comfort for all officers and crew in the worst weather.

The mechanical equipment is complete, elaborate and of the kind that will stand the gaff, yet remain accessible for repairs and adjustments even though the ship is away from port for very long periods.

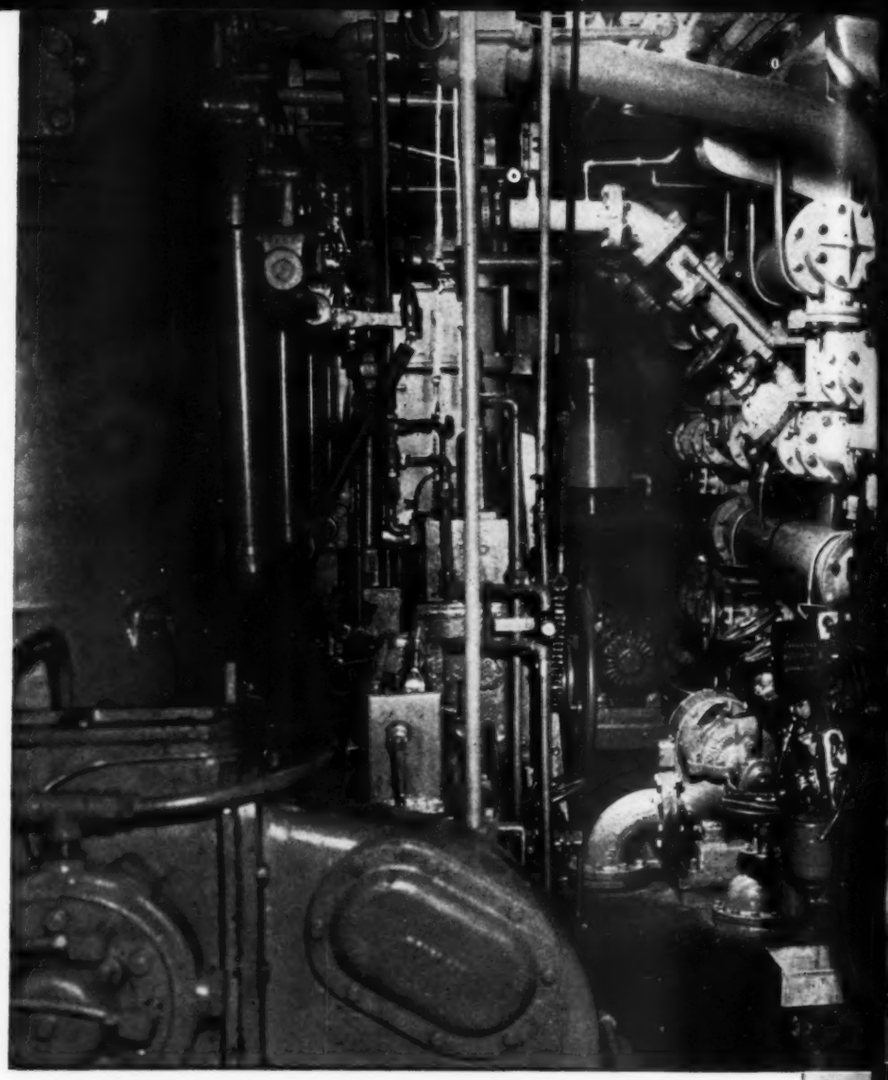
Main propulsion is a pair of 6 cylinder, 2 cycle Fairbanks Morse 14 x 17 in. Diesels, turning 4 bladed Doran bronze propellers 80 x 53 in., through Lignum Vitae stern bearings, and at a maximum speed of 300 rpm. A plain steel plate rudder is fitted, operated by hand or with a Modern Engineering Co.'s electric steering gear.

Designer of the ship was veteran L. H. Coolidge of Seattle, who is with the Army Transportation Corps on special assignment to get out the big new fleet of Wood and Diesel tugs now building in various yards in the Pacific Northwest.

While crammed to the ceiling with equipment, the engine room trunk extends full size to the top of the main deck, giving plenty of ventilation and wall space to hang equipment on. Two John Reiner Auxiliary units, powered with 6 cylinder, 4 cycle 3¾ x 4¼ in. Hercules Diesel engines operating at 1200 rpm. are fitted. Each drives a 25 kw 125 volt D.C. Fidelity electric generator, and a large Exide 115 volt storage battery set is fitted, together with elaborate Westinghouse dead front switchboard, with provision for handling current from two V belt driven 25 kw. Safety Car Co. 115 volt generators one each off of each main engine. Thus for normal operation with both main Diesels working, current for the entire ship is supplied without operating the auxiliary Diesels. At other times and in port, the battery set and the auxiliary sets provide ample capacity for ships lighting, service pumps, anchor and towing winches.

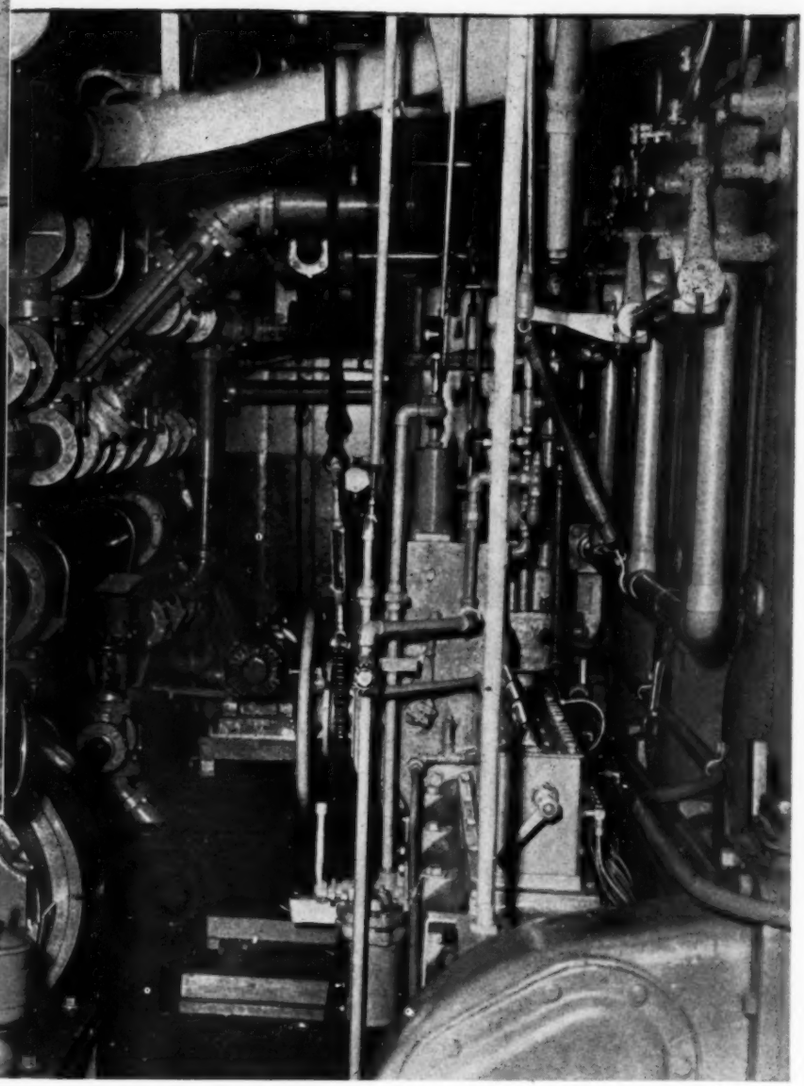
Main thrust bearings are built into the main engines and lubricated from the regular lube circuits which feed the engines. Weston Tachometers are fitted as well as Alnor pyrometers and Ross Heat Exchangers for handling the closed circuit main cooling water supply. A Honan-Crane lube oil clarifier and 3 in. Duplex oil strainer are fitted to each main engine, as well as Viking safety alarm system and Ross lube oil coolers. Two Gardner Denver 2-stage 870 rpm. air compressors, of 4½ and 1⅞ in. bore and 4 in. stroke, operating at 350 psi. are fitted, feeding two pairs of welded steel air bottles, each one of which is 30 x 103 in. overall. The air compressors are each powered with Northwestern Electric 7½ hp. motors.

A Dayton Dowd 230 gpm. at 110 lbs. pressure fire pump is fitted, with 3 in. suction and 2½ in. discharge and 20 hp. Northwestern motor; a Waters Bilge pump of 140 gpm. capacity at



View of the F-M starboard main Diesel, left, and the Reiner auxiliary unit with Hercules Diesels, right.

The port main F-M engine, right and Ross heat exchangers left.



13 lbs. pressure and powered with a 5 hp. Northwestern Electric motor; a Fairbanks Morse fresh water pump of 8-1/3 gpm. at 45 lbs. pressure with Wagner motor; an F.M. salt water service pump of same capacity and power; 3 Dayton Dowd salt water service pumps rated 335 gpm. at 20 lbs. pressure and powered with 5 hp. Northwestern motors supply cold water for the heat exchanger circuits; a Roper fuel oil transfer pump of 3½ gpm. capacity at 40 lbs. pressure and driven by Master Motor; a Roper unit of same capacity for lubricating oil transfer; a Goulds rotary fuel oil emergency transfer pump of 10 gpm capacity, hand operated; and three 2-unit lube and fresh water circulating pumps, composed of a 15 hp. Northwestern electric motor, which drives one Fairbanks-Morse centrifugal 300 gpm. water pump and a 120 gpm. Roper rotary lube pump,—comprise the elaborate pump layout on LT 115.

A Capitol heating boiler with 805 square feet radiation area, supplies circulating hot water to fin-tube cast iron radiators in all quarters. A Johnson Oil Burner operates the heating boiler.

A Modern Engineering Co. anchor windlass with two wildcats and a gypsy, and powered with a 20 hp., 1750 rpm. Northwestern electric motor and a 40 hp. electric towing winch are also fitted.

The pilot house, which is not equipped with pilot house control, has full two way Intervox radio and a Bludworth direction finder, Weston tachometer, Liquidometer rudder indicator and conventional engine room signals for each main engine.

The main deckhouse has quarters for two mates forward, on the port side and large messroom on the starboard side, with passageway up to the pilot house. Aft of this area is the large galley with oil burning range, 2 Servel refrigerators, one for handling frozen foods and one the normal galley type. Next follows the engine trunk, with stateroom for 2 engineers on the starboard side aft and toilet and showers on the port side with connecting passageway between. The towing winch room, almost enclosed, is aft of this space.

Atop the main deckhouse aft are a pair of boats —a 16 and an 18 footer on davits, with a roomy cabin for four of the crew, together with lockers and toilets, large quarters for the Captain with chart table on one side and battery locker for emergency use, with the pilot house-radio room forward. The entire deckhouse structure is of heavy fir framing sheathed inside with waterproof plywood and regular tongue and groove sheathing outside.

These husky tugs are designed to tow two 200 ft. barges of 3000 tons capacity each, at 2-4 knots speed on very long runs. The barge idea is to provide easy floating warehouse accommodation while the tug goes back after more barges, a type of requirement often demanded in remote bases where it is impractical to construct docks and warehouses.

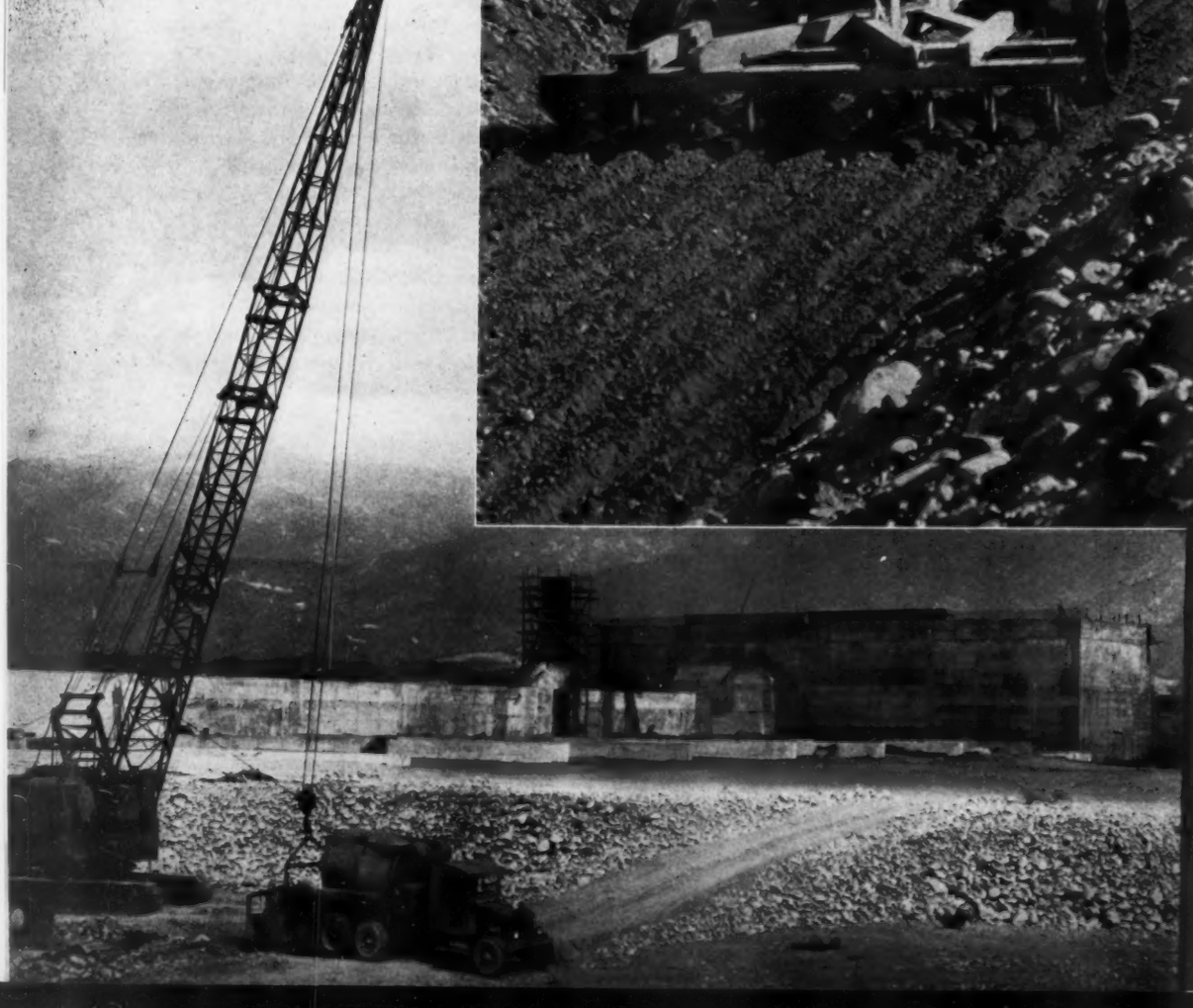
This newest addition to the Army's growing fleet will obviously be a sought-after design post-war, and Grays Harbor Shipbuilding Corp. can well be proud of pioneering this type in the Northwest.

Quartering bow view of the LT115 under way.

DIESELS ON WATER CONSERVATION PROJECT

By

JIM MEDFORD



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ocessing the impervious core of e dam, this string of equip-ent is led by a Cummins Diesel gined sprinkler, then an Inter-tional Diesel-tractor-pulled rrow followed by two Cater-llar Diesel-tractor-pulled sheep-t tampers.

This Murphy Diesel-engined Northwest shovel is feeding a portable plus-six grizzly used on the early stages of dam construction.

COMPLETION of the $8,837,200 Santa Fe Dam will weld the final link in the gigantic Southern California water conservation plan for impounding the waters of the San Gabriel River. This four-and-a-half mile dam, with a capacity of 36,000 acre feet of water, is under construction in the foothills of the San Gabriel Mountains near the town of Azusa on the west slope of the dividing range between the Mojave Desert and the Orange Belt. It is a United States Engineer Department project withholding former lowland flood waters for diversion to citrus and agriculture irrigation.

Of the 12,400,000 cubic yards of material necessary to be moved to create the 92-foot structure, 1,400,000 yards for the fine impervious core is supplied by No. 1 borrow pit four and one half miles from the dam site with grade not exceeding 2 per cent. This material is placed in core as it comes from the pit by 150 hp. Cummins Diesel engined 15-yard Euclid bottom-dump earthmovers loaded by Northwest 2½ yard, 160 hp. Murphy Diesel engined shovels. These shovels, working close in with short dipper stick for maximum digging effort and maintaining short boom swing radius by careful transport spotting, permit the Diesel Euclids to roll into the pit, turn, spot, load, and get away within three and a half minutes. This is possible because the six swings are made with the shovel working parallel with bank so the Euclids move straight ahead through loading zone. Round trip hauling time is approximately 38 minutes, spreading as they unload. Allowing ten per cent trip delays, time for moving 15 yard loads is around 45 minutes for the nine-mile 'round trip at a fuel cost of approximately 19.5 cents. When these Euclids are not on this run, they are used to handle coarse material for the pervious zones from the grizzlies, two of which are mechanical and powered with 200 hp. General Electric motors driving the five-foot rubber conveyor belts.

There are two Model 80 Northwest 2½ yard shovels on the job each powered with a 6 cylinder, 5¾ in. x 6½ in., 160 hp. Murphy Diesel showing an operating cost of five gallons of 5½ cents fuel per hour per shovel.

Dumping the fines at speed in the No. 1 zone, or core, the Euclids swing along on the return for more material, the twenty-two fifteen-yarders circling like the grinning horses on a county fair merry-go-round. Following the Euclids over the impervious zone, sprinklers wet down the dry material for the International TD18 Diesel trac-tractor with Kay-Brunner harrow and the Caterpillar D8 Diesel 'dozer tractors with their tandem sheepfoot rollers. The harrow roots cut the boulders and a following labor gang tosses them into the coarser adjoining zones. Then, with eight passes, the 'dozers and tampers impact to an average of 132.4 pounds per yard for the first 100,000 yards. These Caterpillar D8's burn 4½ gal. of 5½c fuel per hour of effort.

In addition to the large excavation-placement yardage, there are 182,000 yards of concrete, 11,500,000 pounds of reinforcing steel for the concrete, and 1,920,000 additional pounds of steel will be used for gates and other purposes.

Equipment used on the dam includes: the twenty-two Cummins Diesel Euclids; four Cummins Diesel Euclid sprinklers; fourteen Caterpillar Diesel tractors; four Diesel motor patrols; two Murphy Diesel Northwest shovels; one Atlas Diesel P and H crane; two Marion electric shovels and twenty Hall-Scott gasoline Maxi trucks.

The project was started under the direction of Col. Edwin C. Kelton, district engineer, now transferred to head the Pan-American Highway Commission. Col. Rufus W. Putnam is the present district engineer in charge and with him is Major Milburne Webb from the Florida Atlantic-Gulf Ship Canal, now Administrative Officer for the 240,000 square-mile Los Angeles District. J. G. Morgan is resident engineer since the start of the project.

PACKING POWER IN MARITIME COMMISSION V-4 TUGS

By WILL H. FULLERTON

MUCH interest attaches to the United States Maritime Commission's V-4 tug-building program, involving some forty vessels of this classification, because of their unusual size and adaptation of machinery. While it is still not feasible, under present conditions, to reveal the entire story of these hard working, sea-going tugs, the Maritime Commission has consented to the release of certain material of general interest to the Marine and Diesel fields and in recognition of those who have contributed to the success of this program. Among the latter are the shipyards which have broken many records for speed and efficiency in completing V-4 tugs on fast schedules, often beating the timetable, as well as the engine and equipment builders who have delivered the machinery.

Last month DIESEL PROGRESS carried a general description of the 194 ft. 9 in. V-4 class tug as typified by the Superior Diesel engined "Seguin," first to come off the Avondale Marineways, New Orleans. The present article deals with two groups of eleven tugs each, some complete and some building, all powered with Enterprise supercharged Diesels. A few of the tugs in these groups are shown in launching views, herewith, recently taken at the Pendleton Shipyard Incorporated, New Orleans, Louisiana.

The first group of eleven tugs were fitted with Enterprise 6-cylinder Diesels, two engines for each tug, giving a total of 2320 rated hp. at 350 rpm., driving through electric couplings and reduction gears turning the propeller at 132 rpm. This group of 22 engines were arranged for supercharging by use of Roots-Connersville blowers of the motor driven type, receiving their power from the ship's auxiliary Diesels. These superchargers are driven at constant speed, the engine controls being so arranged that at the time the engine is started the supercharger is inoperative, remaining so up to the point where the engine develops its normal non-supercharged rating at which time the supercharger is cut in to provide for the higher output. This control is fully automatic and by the use of a valved by-pass from the discharge back to the suction, operating on low pressure differential, favorable supercharging control is maintained over the entire range of supercharged output.

The next group of eleven tugs are also each powered with a pair of Enterprise Diesels but in this group the engines are equipped with Elliott-Buchi exhaust gas turbochargers. The use of this method of supercharging has been

U. S. Maritime Commission Tug "Southwest Pass" is launched with a splash at Pendelton Shipyard, New Orleans.

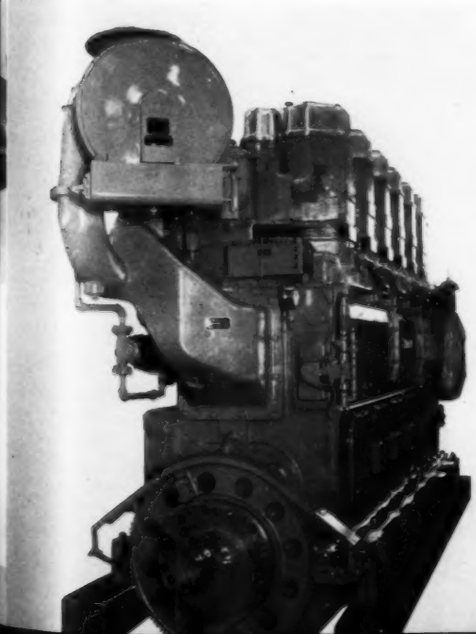
advantageous through the reduction of auxiliary power equipment, multiplicity of blowers, motors and controls in addition to which the engines develop a continuous rating of 1500 hp. at 360 rpm. Since the output of the supercharger is not a function of the speed of the engine but is rather a function of the quantity of fuel being burned per stroke which determines the amount of gas available for driving the turbocharger, the torque conditions of the turbocharged engines have proven favorable. Excellent maneuverability is achieved through the combination electric coupling and gear drives by means of interlocked coupling switches and engine controls so arranged that either engine can be separately maneuvered or both engines can be maneuvered simultaneously as desired. Rapid maneuvers at half power, a highly advantageous feature in this type of craft, is achieved by running the engines in opposite directions and energizing the couplings as required.

The United States Maritime Commission has created and sponsored many unique and interesting designs with splendid records of success, and these V-4 tugs give every promise of upholding the Commission's reputation for knowing what it wants and how to get it.

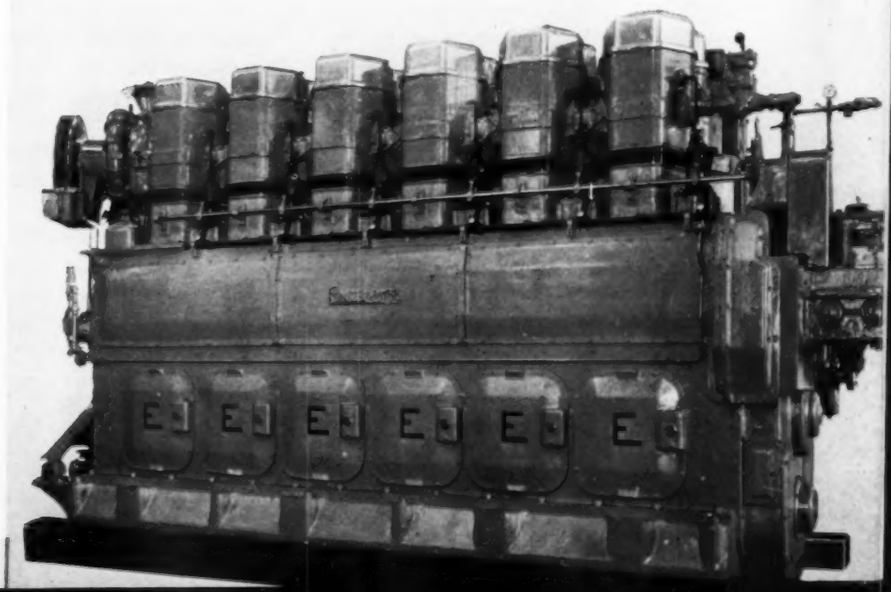
View of the launching party for the tug "Bayou St. John."

Another Pendleton-built V-4 tug, the "Race Point" poised for sidewise launching.

Aft end of the Enterprise DMO-36 Diesel with Elliott-Buchi turbocharger.



Injection side of the turbocharged Enterprise Diesel, two of which power each of the 22 V-4 Maritime Commission tugs described in this article.



VIDALIA, LOU

By M. R. WOOD

VIDALIA, La., is located on the banks of the majestic Mississippi just across the river from historic Natchez, Mississippi. Natchez and Vidalia are joined by a beautiful all steel bridge which was built over the river not many years ago. After the Mississippi River Bridge was constructed, Vidalia was almost completely rebuilt in a new location some distance from the river. Even the elevated Municipal Water Storage tank was drained and moved to the new location of the light and power plant. The entire electrical distribution system was rebuilt, new wells drilled, and extensive waterworks improvements made.

Probably the most important single asset of any town fortunate enough to have it—is ownership of the municipal power, light and water system. Vidalia, Louisiana has always owned and operated its utilities. For many years the town generated its own electricity, operating steam generating sets—and in fact continued such operation until 1938. By that time, however, the equipment had depreciated to such an extent that it was no longer economical to operate. In the face of an attractive offer from the Power Company and in the absence of a definite means of financing the purchase of a Diesel Electric Generating System, the Town decided to purchase its current.

This arrangement was by no means to be permanent, however, and was made to gain time in formulating plans to put the Power, Light & Water Plant 100% back into the hands of the citizens of Vidalia. Although current was purchased, the Town still operated its utilities and through efficient management and the addition of other enterprises, such as the construction of a natural gas distribution system, was able to see its way clear in the course of the next three years to purchase its first Diesel engine. Sufficient space was provided in the new building for future expansion.

Management of the Vidalia Water, Power & Light Plant has always been conservative—there has always been a policy of "look first and jump afterward"—and so the idea of Water, Light & Power Plant improvements was given careful consideration—after it was decided to go ahead, the same careful consideration being given to selection of the Diesel Generating equipment and the construction of adequate distribution equipment, buildings, etc.

A 225 hp., 3-cylinder, Fairbanks-Morse Diesel proved to be what was required and this unit together with alternator and other auxiliary was immediately purchased.

The Town was most fortunate in having a man like Supt. L. C. Vance available at the time. Under his supervision Vidalia has erected a power and light and water plant that is indeed a property to be proud of—but let us quote from a newspaper article of a neighboring town

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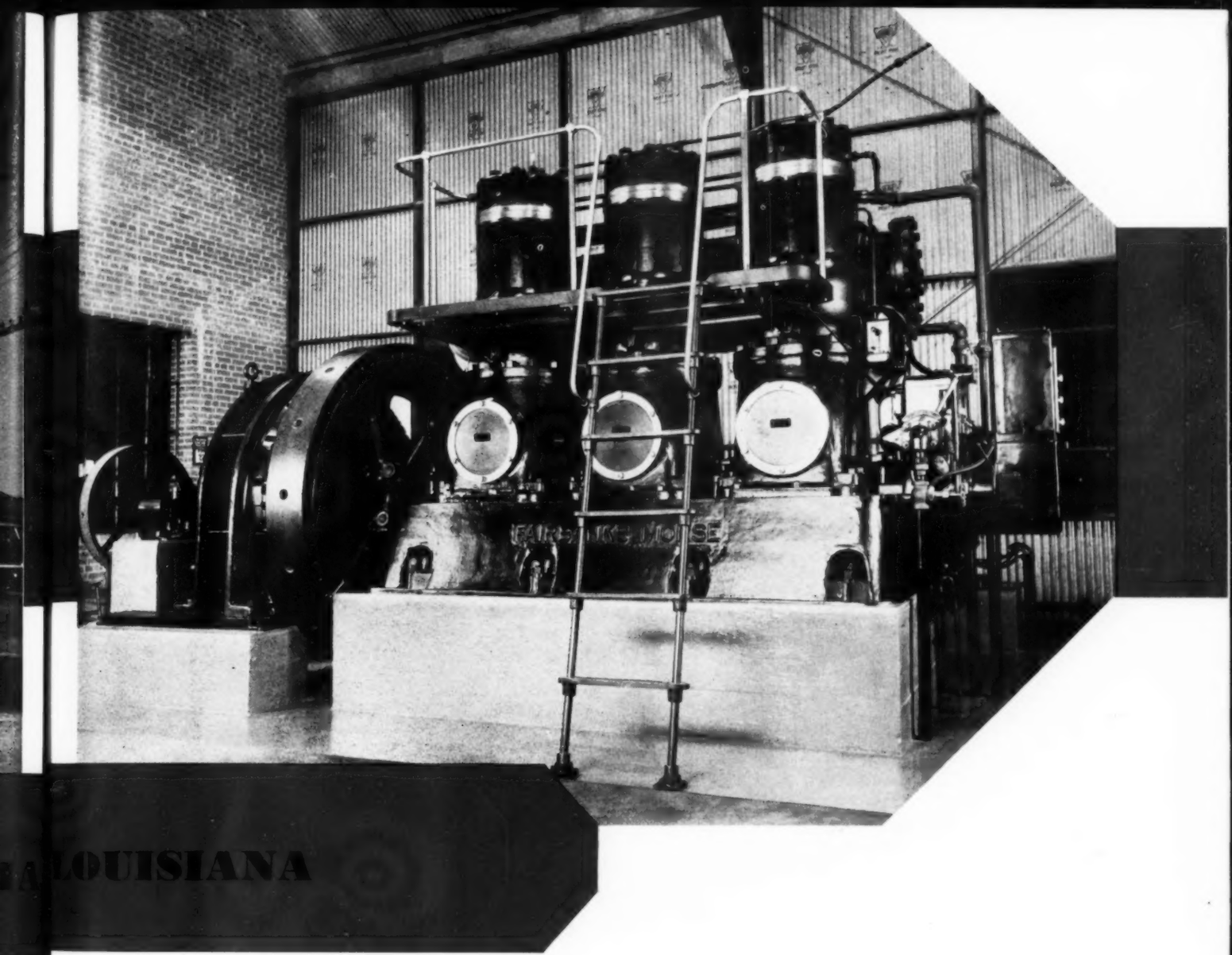


LOUISIANA

issued not so long ago—an article that must have been inspiring to Supt. Vance especially, and the citizens of Vidalia as a whole. The article in part reads as follows:

"Under the supervision of Supt. Vance, this superb new station is one of the finest and most complete units of its kind we have ever seen. A brand new Fairbanks-Morse 3-cylinder Diesel Generating Set has been installed together with new and efficient rotary electrically driven high pressure water pumps, deep well air compressors, and other such equipment as is necessary for a modern and efficient electric power and water supply plant.

"Mr. Vance has taken particular delight in making the plant pleasing to the eye. Floors are solid concrete and are painted in deck gray, while all the generators, engines, air compressors, motors, etc. including piping and switchboards, are finished in glistening black.

"There are two types of every machine, says Mr. Vance, thus insuring uninterrupted service in case any one machine should have to shut down. This scheme is carried out in the pumping equipment also. The huge Diesel Engine is completely controlled by automatic switches and represents one of the most complete power units to be found anywhere today.

"While the town is served by purchased electricity at this time, its own installation guarantees to the citizens of Vidalia uninterrupted service in case of damage to the power line by storm, fire or any other emergency. This is a great satisfaction in case of fire especially.

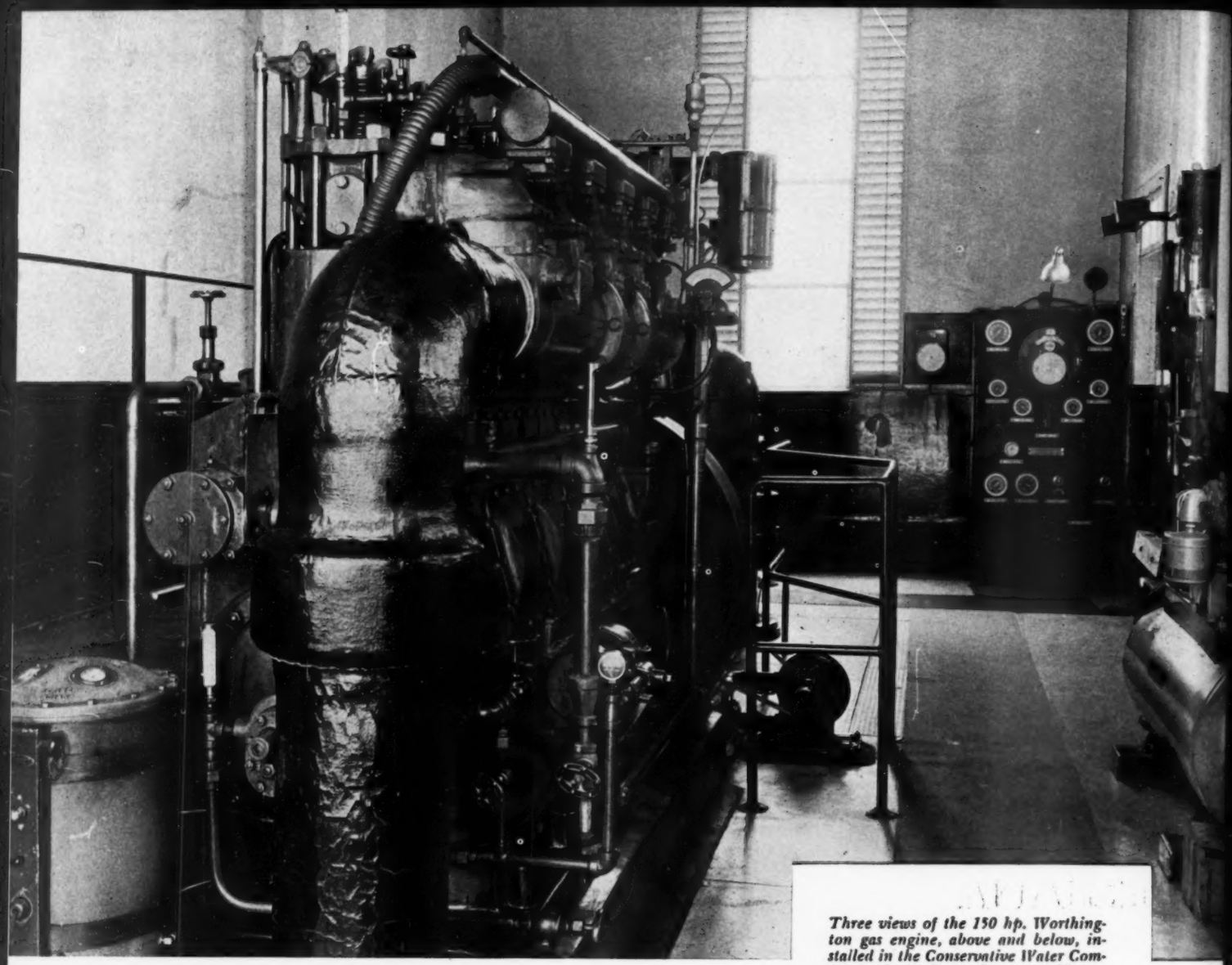
"Throughout the main plant strips of non-conducting rubberoid matting have been placed on the floor, down the center and leading to all machines, thus presenting a most efficient and orderly appearance, and adding a great safety measure as well.

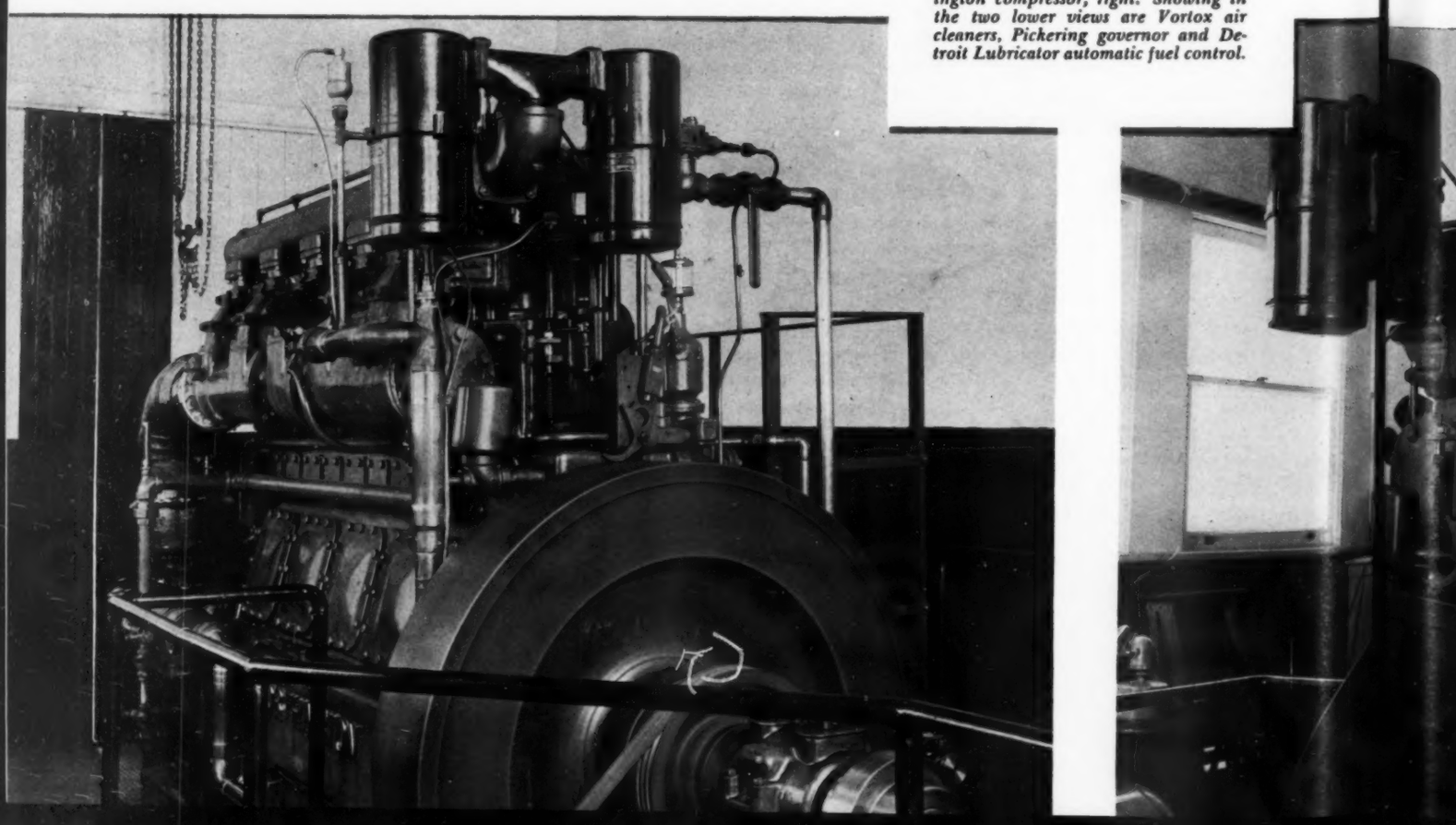
"The grounds surrounding the plant have received their share of attention also. Neat concrete walks, green lawns, flowers and shrubs make its appearance a most pleasing one.

"Frankly, it is a power and water plant show place and Mr. Vance has certainly done a fine job. It is compact efficiency from any angle you view it, and thanks to Mr. Vance's untiring efforts, it is proof that cold brick and machinery can be made attractive as well as efficient."

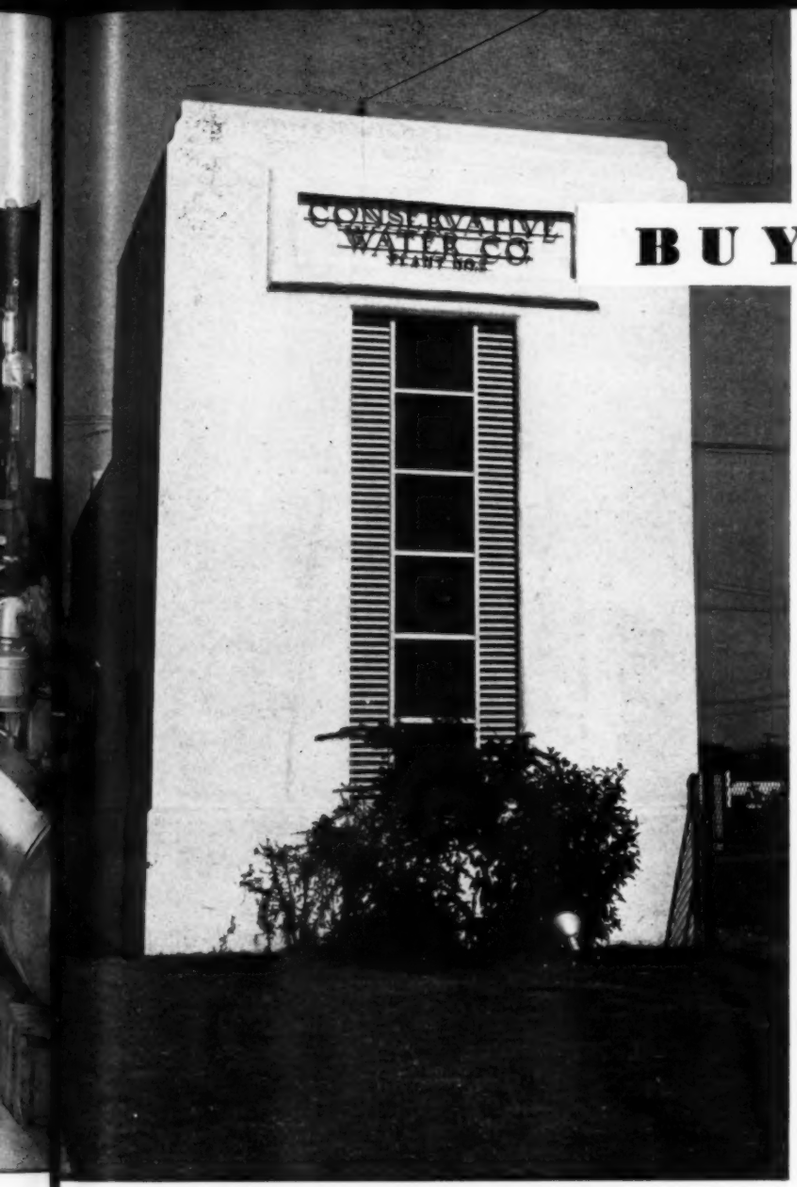
Now that is mighty fine praise, but from close observation it is mighty well deserved. Much praise is due also to the Mayor and the Board of Aldermen for their rare foresight in providing such a fine asset for the town.

The Fairbanks-Morse Diesel is equipped with Burgess exhaust snubber, Ross jacket water heat exchanger and Alnor pyrometer. The switchboard is a Westinghouse product.

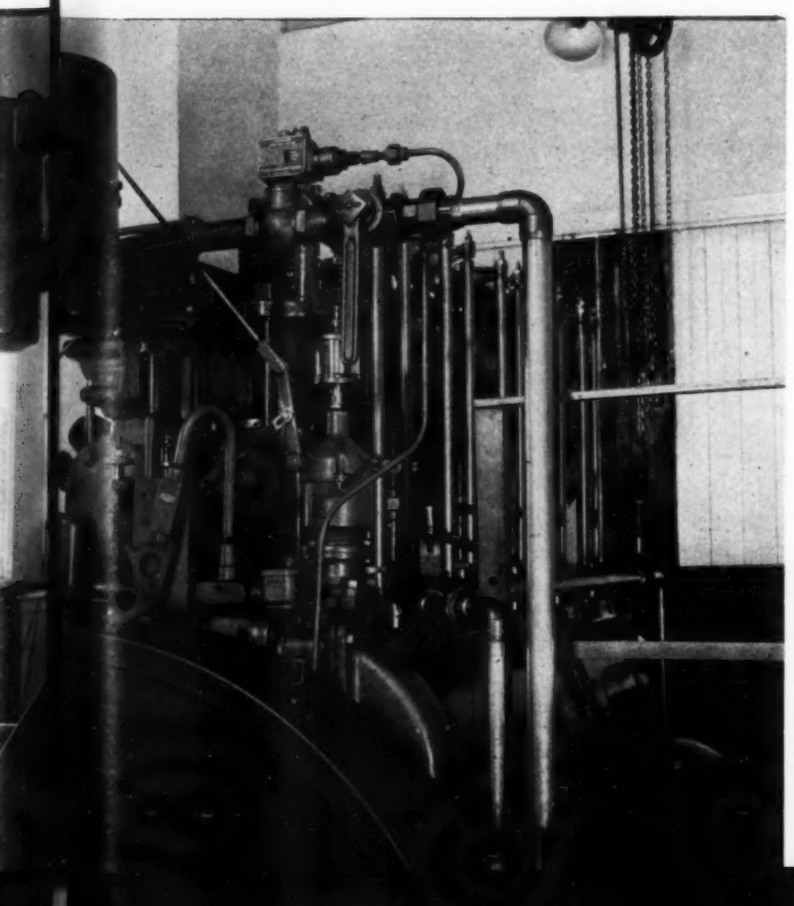




Three views of the 150 hp. Worthington gas engine, above and below, installed in the Conservative Water Company plant. Seen above are Honan Crane lube refiner, left, and Worthington compressor, right. Showing in the two lower views are Vortox air cleaners, Pickering governor and Detroit Lubricator automatic fuel control.



The compact and modern power plant building.



GAS ENGINE BUYS WAR BONDS

By JIM MEDFORD

WHEN one water company says to another water company "You haven't got the kind of money it takes to buy a gas engine," they figuratively have bred a scab on the end of their industrial nose. Because in Southern California where there are a number of independent water companies of various size serving districts in the Los Angeles Metropolitan Area, there is bound to be a certain amount of constructive competition between them.

And when one of these water companies with a brand new three-cylinder gas engine just installed cracked out at Walt Harrison, engineer-in-charge of the Conservative Water Company in the Southeastern District back in 1939, Walt put it up to his president, O. B. Frank. At the same time the canny engineer mentioned, casually, that the other company man said something about "You can't use bottle caps for money with an engine company."

Thereby came a sharper gleam in the blue eyes of President Frank. He'd been thinking about changing over from purchased electric to company-owned power for some time. This crack from another independent made his mind focus. This spelt action for the energetic little man. And so it came about that a few days later a group of three sales engineers assembled in Mr. Frank's office—one each from the gas company, the pump company and the engine company. Walter Harrison was there, too, and he had ideas, as we shall see later. Three contracts were signed, pronto, and the engineman heard as he went through the door—"Get that Worthington here, we're starting building!"

A pleased man was Engineer Harrison. He as good as had his gas engine, one two cylinders larger than the other company's installation; a total of 150 hp. at 514 rpm. And Mr. Frank's "We're starting building" meant just that. Plans were rushed to a contractor for a $3,000 reinforced concrete powerhouse to replace the small frame building that housed the electric motor.

That it is a credit to the community can be seen from the illustration. Into the new building went the $12,283 engine, plus $2,178 worth of equipment, a total outlay of $17,461 that might never have changed hands in this way had not a waterman wisecracked.

President Otto Frank and Engineer Walt Harrison. Insert: Closeup of gauge board

You see, President Otto Frank is the kind of a genial soul that has made American business great. His hesitancy up to this point was because he didn't want the cost of any improvements passed on to his customers. He wasn't going to raise the water rate. Not him. But when the gas company representative figured the monthly cost of gas for a Worthington engine of 150 hp., and the president took another *dekko* at those Edison bills, it was the engineman that offered his fountain pen.

But this was only the beginning—just the start. Engineer Walt Harrison for years, most of his then seventeen years with the company had been hankering for a gas engine. And when Mr. Frank turned to him and said, with a grin, "She's yours, get her going;" the engineer walked out without his straw kelly, he was that tickled. Didn't he have his gas engine, and didn't it have two more cylinders and 60 more horses than the "you can't use bottle caps" guy had? From now on Walt was going places.

From here on this becomes a story of a man with seventeen years of ideas, putting them to work. It about baffles the writer to put them into words but we've come this far together. So, I'll try to put it down as I saw it in detail and Walter Harrison explained them. I'm sure you will find it interesting and, I hope, informative.

In the tall, gray power house went first a foundation for the Worthington. It was *a foundation* of 26 cubic yards of tight concrete, 16 by 14 feet and five feet deep. There wasn't going to be any vibration—and there isn't.

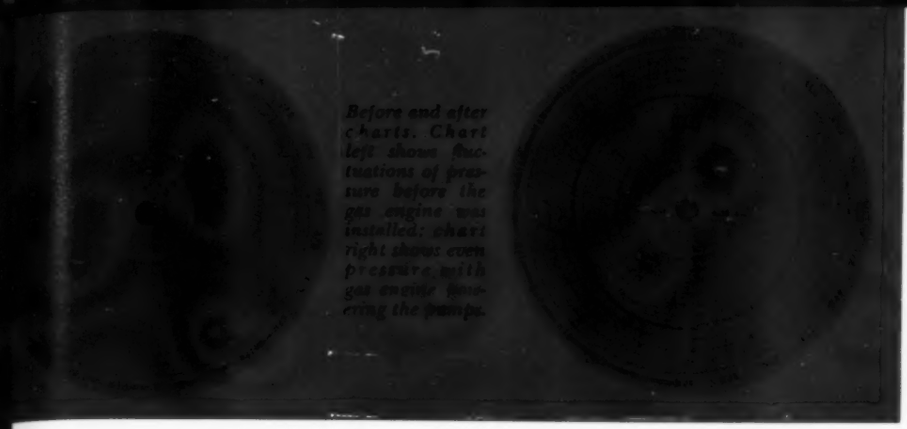
A silent exhaust was imperative. There were dwellings right next door—ten feet away. Now, the exhaust of a Type BG5 throws out a noise like a 12-inch trench mortar. This problem was solved with an expansion chamber and a Maxim exhaust silencer.

Jacket water circulation control was next on the list of applied ideas. It not only wasn't going to be run through coils in the water main, as is the common and easiest way, but it was going to be so constructed and installed that cleaning would be easy and with no interruption of power output. A ten-foot heat exchanger with forty ¾-inch tubes was installed under the concrete-slab floor but readily accessible by removal of covering plates.

This exchanger is divided into sections, half the tubes to each section, 183 gpm. passing one half the tubes in one direction and returning through the other half by pressure created by a centrifugal pump belt-driven from main engine shaft. A by-pass is connected across the two exchanger leads and thermostatically controlled at the engine to maintain constant circulating water temperature of 165°F.

Exchanger cooling is accomplished in a simple manner by the use of a 6-inch venturi in main 12-inch discharge from the direct-connected deep-well pump. Inlet to exchanger shell is just beyond check valve and outlet enters the line again at the venturi throat. This method eliminates the usual additional pump for this service and pressure drop is less than 0.5 pounds per square inch.

Generally the cleaning of a heat exchanger is quite a chore and by and large therefore is often put off. But this is not so here. This was licked by another idea, that of by-passing with one-inch lines direct from main leads of the raw water supply to exchanger leads to engine cooling circuit. Closing of two valves to shell and two valves in tube leads, then opening by-pass valves, isolates the exchanger and connects the circulating system direct with raw water



Before and after charts. Chart left shows fluctuations of pressure before the gas engine was installed; chart right shows even pressure with gas engine powering the pumps.

supply and the regular circulating pump functions as before. Then, off comes the exchanger head and using a regulation flue cleaner, the tubes are cleared of scale. This is regularly done once a year.

Constant pressure in the water mains was always the company's aim but with electric motors it had never been a fact. And here, with the installation of the gas engine, we have the feature accomplishment of this "idea" plant.

To get the full impact of this crowning achievement, the accompanying charts are exhibited for the record. They amply verify the Conservative's contention that excellent even system pressure can be maintained by pumping direct into distributing mains, if and when a properly controlled gas engine is installed as the prime mover.

Water demand controls engine speed under the maximum set by engine governor. This is done by means of a pilot operated, pressure-speed control device mounted on switchboard and set in pressure lead from main to fuel control on the engine. Though this device functioned perfectly with the two electric motor-driven pumps off the line, when they came on, they created a definite problem—that of surge. When these pumps went into service, the effect was to throttle engine to low speed. When they went off, the reverse took place, the engine raced. In addition, at both periods, extreme speed oscillations were rampant.

This occurred because when the motors came on, they assumed part of the load, engine rpm. dropped; when the motors cut out, engine rpm. built up to compensate. However, as with all other difficulties encountered, the idea that licked this was the insertion of a damper or pressure equalizer in the pilot line ahead of the automatic pressure-speed control. This damper device is a simple 4-inch by 1-inch tube with ½-inch male and female threads that act as baffles, overcoming surge velocity. It is set in the line and becomes part of it. And by this simple device, the fluctuations in pressure on controls is less than two pounds.

As a further safety precaution, at 5 P. M. when the engineer makes his final daily inspection, he turns on a pair of mercury switches set for a maximum of 65 pounds and minimum of 30 pounds, respectively. These switches are mounted inside the cabinet switchboard and are cut in ahead of pressure-speed control. In event of this speed control sticking or its failure to function for any reason, because of these switches pressure cannot raise more than three pounds, neither can the pressure drop more than the same amount, holding the supply main pressure closely to the boundaries of 62-33 pounds. Any deviation in excess of the limits set, results in one or the other of these mercury switches going into action on pilot pressure-speed control line and stopping the engine.

Wouldn't it seem as if this was aplenty in safety devices? Engineer Harrison didn't think so. Into the periphery of the flywheel went a spring-loaded pin set at 550 rpm., 36 rpm. over the rated number. Its function was to emerge through centrifugal force at 550 rpm. and trip a cam controlling the magneto, shutting down engine. In addition there were the usual devices for engine stoppage in event of lube oil pressure drop, and overheating of jacket water.

During the day the operator starts and stops the two motor-driven pumps should the water demand exceed the engine's capacity of 2,000 gpm. During the times the engine is shut down for any reason the 35,000-gallon standby tank is valved into supply mains and automatic motor controls set to start their pumps as tank empties holding a main pressure of 33 pounds. When the tank is refilled the pumps cut out to go back on line as tank reaches minimum gallonage. This keeps up until gas engine is put onto line again. Though the engine is controlled automatically once started, it is started by means of a two-stage motor-driven compressor mounted on air bottle.

To make things clear, let's go back to just before *juice* went out and *gas* came in. That was an important day in the Conservative's life and taken from their records, here we'll begin to bail out some figures. At that point, with automatic electric clocks recording, the electric power cost per month for 250 connected horsepower was $812.22, or $487.33 for 150 horsepower, the rating of the new gas engine.

With these figures in mind, let's take a look at the records during the months just passed. Electric energy cost for 200 horsepower, a 75 hp. motor and a 125 hp. motor each driving a single pump, was $564.51 to deliver 38,934,000 gallons. But, for $147.02 worth of natural gas, the 150 hp. Worthington gas engine pumped 49,672,000 gallons under the same conditions. And this is typical, by the record.

That's pretty good, we think, but that isn't all. In May of this year new bowls and impellers were installed by the manufacturers in the gas-engine-driven deepwell pump. Here are the comparative figures, before and after pump overhaul, in that order—322,000 cubic feet of gas pumped 1,261,000 gallons; 106,000 cubic feet of gas produced 1,531,000 gallons. It appears, too, that it paid dividends to give some attention to the pump.

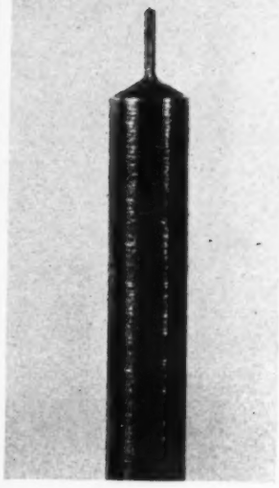
But, you ask, what about repairs on this hard-working and faithful machine? A fair question, and here they are—for four years—valves ground four times, new main bearings once, 2 new valves, 1 set of rings, 7 valve seat inserts, 2 valve guide bushings, and 4 wrist pins. The top piston ring is changed annually when valves ground and main bearings are checked at the same time.

Oil is changed each 3,000 hours, crankcase is flushed at same time. Refiner packs are changed each 1,000 hours and oil is not reclaimed.

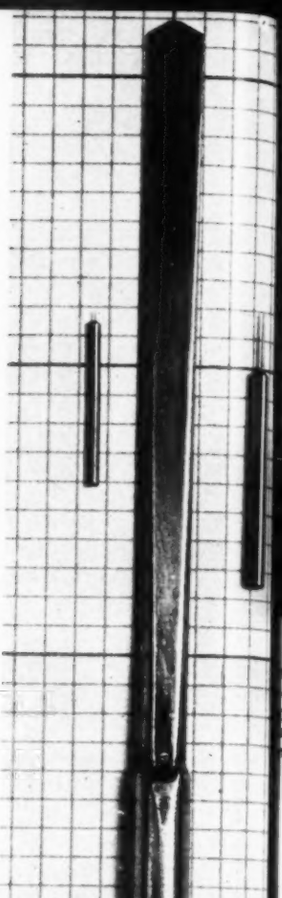
As to paying off cost of engine, that was easy. Just the saving in cost of fuel did it in exactly three years, and the engine is as good as new with its dividends earning the equivalent of two hundred War Bonds annually—something this "idea" company is not neglecting.

In addition to the Worthington gas engine, other items of equipment include: Worthington air compressor and jacket water circulating pump; Layne-Bowler deepwell pump with Flexishaft and Farrel-Birmingham head; Honan-Crane lube oil refiner; twin Vortox air intake filters and silencers; Maxim exhaust silencer; Chas. M. Bailey switchboard, gear and instruments: Bristol recording meter; lube oil pressure control by Detroit Lubricator Co.; lube oil cooled by Gross; cooling system thermo control valve by Ruggles-Klingeman; travelling crane is by Yale; mercury switches by Minneapolis-Honeywell.

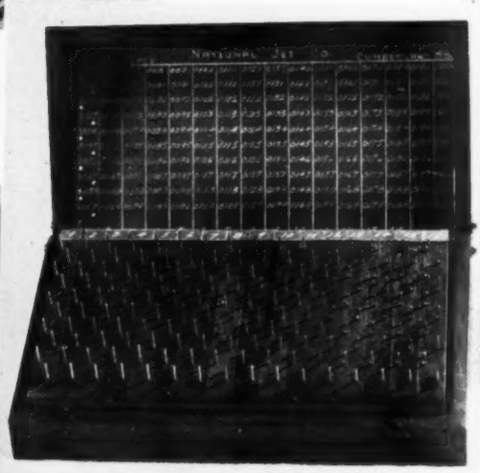
Production of microscopic drills requires sensitive machines and measuring tools.



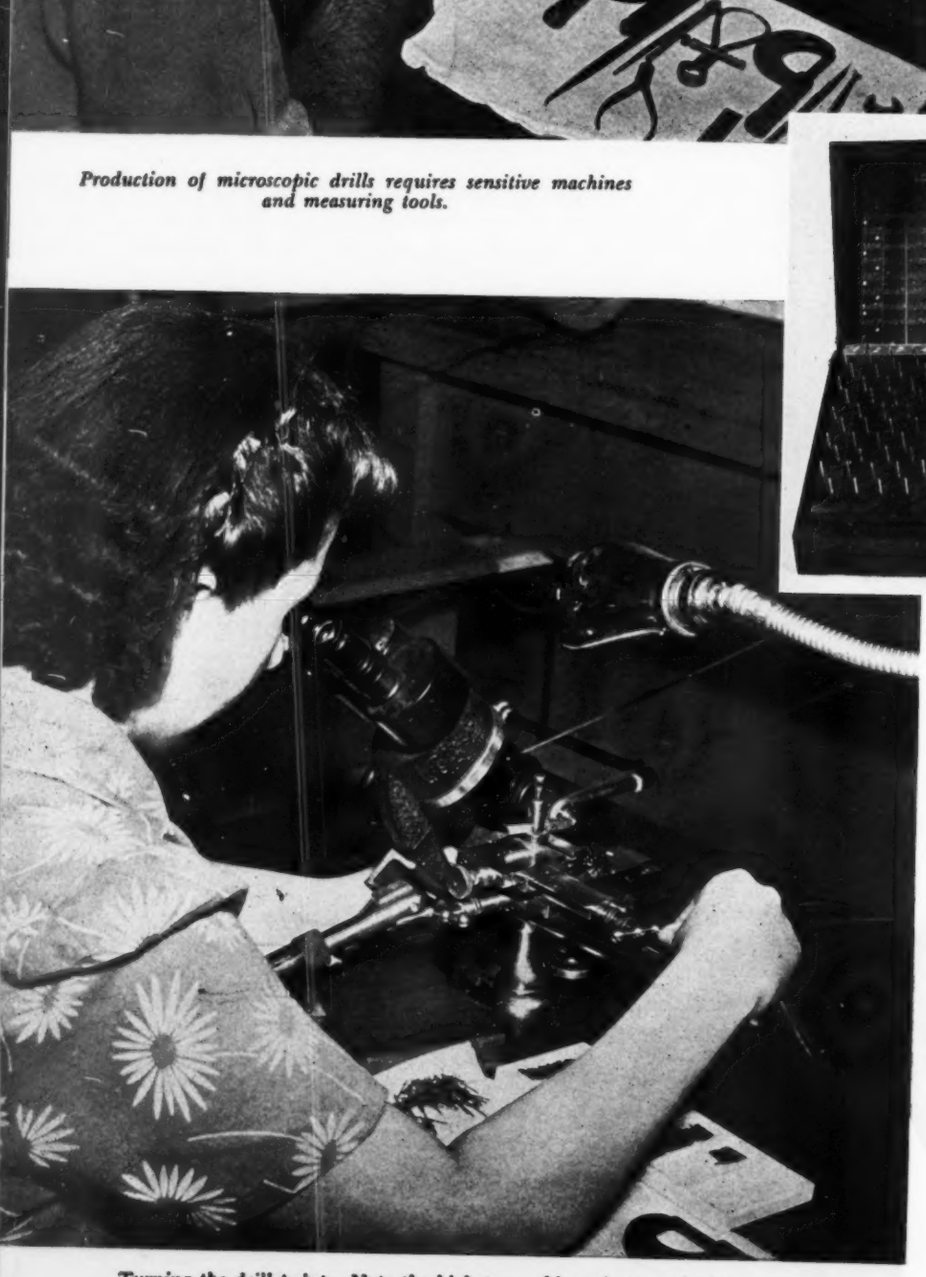
Microphotograph of a 0.0054 in. diameter drill enlarged 15 times. Note standard drill point length is seven diameters.



Left to right: The 0.005 drill, a 0.181 in. drill and gun-type reamer photographed without magnification but enlarged to about twice actual size.



An assortment totalling 160 drills ranging from 0.005 in. to 0.02 in. diameter in steps of 0.001 in.



Turning the drill points. Note the high power binoculars required for this delicate work.

MICROSCOPIC PRECISION DRILLING

NEW AMERICAN INDUSTR
MEETS A BASIC NEED I
DIESEL MANUFACTURE

rophotograph of a type reamer, 9/64 in. 0.019 in. maximum eter with a 3-degree enlarged 15 times.

Finishing the drill points requires the delicate touch of an experienced operator manipulating the flexible shaft-driven grinding wheel entirely by hand.

WHO can say just what the heart of a Diesel is? Top performance of a Diesel is the end result of optimum coordination of a vast number of details of design, manufacture, assembly and operation—any one of which may well be considered the "Heart" of the composite machine. We have learned, however, that the size and accuracy of fuel injection nozzle orifices are vital factors in the end result of compression ignition. It has been determined by actual test that variations as small as 0.0001 in. in orifice diameter will either starve the engine or cause smoky operation with consequent loss of power and overall life. And while we have drilled nozzle holes—after a fashion—for well over thirty years, depending on foreign made tools—the then best available—war time conditions and the accumulation of test data on nozzle performance have brought about a progressive need for more accurate, longer lived, microscopic drills —available right here at home.

Little did John A. Cupler II of LaVale, Md., know that he was laying the groundwork for the fulfillment of this need—timed almost to the hour—when he started to explore the possibility of producing better microscopic drills with little more than a worktable and an idea in his bedroom only a few years ago. Mr. Cupler had been employed on a small-hole drilling job when this idea hit him and basically he sought a method of making cleaner — more precise microscopic holes. Like most pioneering ventures, his first efforts were derided but being a stubborn individual—by his own admission—Mr. Cupler knew he had something and he persisted relentlessly. The sagest philosophers have not yet put their analytical fingers on the elusive spark of something with which certain individuals are endowed which causes them to break through imponderable frontiers but any layman can view the results even though a microscope is needed as in this case.

Neither can we relive, with Mr. Cupler, his long hours of research and trial and error, nor fully comprehend the sort of courage it required to cast aside all accepted practice after reading 100 years' accumulation of knowledge on the subject. Emerging eventually, however, from his bedroom to his garage and thence to a modern two-story plant and laboratory as the National Jet Company Mr. Cupler brought with him the answer to one of the most basic and acute needs of the Diesel industry, as well as those of many new and vital industries, such as synthetic silk production, television and precision instrument manufacture.

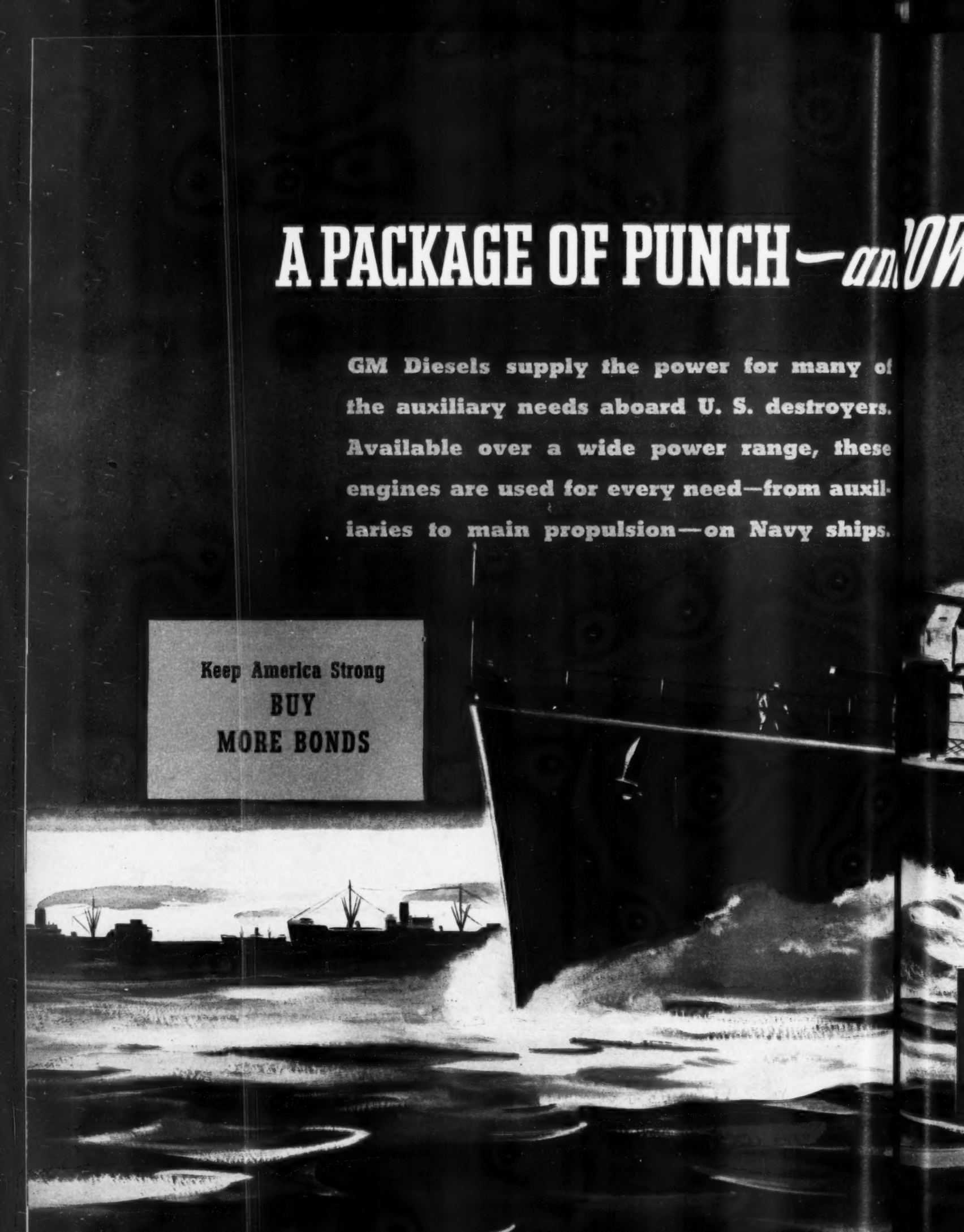
It was long generally conceded that 0.002 in. was the smallest practicable diameter for a drilled hole but Mr. Cupler has succeeded in producing a drill capable of chewing a 0.00025 in. hole through 0.004 in. of annealed steel; another will make a hole 0.005 in. in diameter through 0.01 in. of the hardest steel known; or still another produces a 0.003 in. hole—about the size of a human hair—through ½ in. of tool steel. The only stuff Mr. Cupler will not drill are diamonds—he is just not interested or he would drill them.

In drilling an alloy of spring and tool steel through 0.025 to 0.035 in. thickness, green operators using Mr. Cupler's drills have averaged between 100 and 200 holes per drill; experienced operators get between 500 and 600 holes per drill. Two production records catch the eye; one of 2700 holes with one drill, another of 3500 holes with one drill. With such production records and an assured reduction of nozzle rejection resulting from precision sized drills, it appears that the Diesel industry has been given the double seven-league boost of greatly reduced production costs and more rigid control of ultimate engine performance.

Picture making a production line job of drilling injection nozzle holes with such marked improvement in production statistics that well over a hundred thousand new and unused foreign-made drills were scrapped forthwith. Mr. Cupler's drills coupled with National Jet Company engineering service accomplished that for one of our largest Diesel engine manufacturers. Back of such performance are certain established differences between imported drills and these now American-made tools, consisting of a guaranteed accuracy of drill diameter within 0.0001 in.; many times the drill life heretofore known; practically unlimited length of drill point—0.004 in. drills have been made in lengths up to ½ in. Some Diesel engine builders ship blank nozzles to National Jet Co. for drilling, heat treating and complete preparation for assembly in the engine, another vital service this new enterprise offers our industry.

A PACKAGE OF PUNCH—and ON

GM Diesels supply the power for many of the auxiliary needs aboard U. S. destroyers. Available over a wide power range, these engines are used for every need—from auxiliaries to main propulsion—on Navy ships.



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DIESEL
POWER

The National Inventors Council pauses for its photograph during inspection of the GM Cleveland Diesel Division Plant. Left to right in center of front row are George Codrington, Dr. Orville Wright and Charles F. Kettering.

G. M. CLEVELAND DIESEL DIVISION HOST TO NATIONAL INVENTORS COUNCIL

One of the highlights of the Cleveland meeting was dinner for the Council at the Union Club as guest of George Codrington.

FORMED under the Department of Commerce in 1940, the National Inventors Council for consideration of applications for patents submitted by inventors for the improvement of machines used in our war effort, met in Cleveland, Ohio August 24th. As the guest of George W. Codrington, GM vice president and general manager of the Cleveland Diesel Division, the council inspected the GM Cleveland plant and was dined at the Union Club. Blue bloods of American research and inventive skills concentrated in the National Inventors Council appear at these regular monthly meetings as a veritable galaxy of stars in this field. Prominent, even among such lights at this Cleveland meeting were Dr. Orville Wright, director of the Wright Aeronautical Laboratory; Charles F. Kettering, vice president of General Motors and chairman of the Council; Dr. Fin Sparre, director of research for E. I. du Pont de Nemours & Co.; Fred Zeder, vice president of the board of Chrysler Corp.; Dr. William D. Coolidge, director of research for General Electric Co. The Army and Navy technical branches were literally represented by Lt. Col. L. B. Lent of the army air forces, Rear Admiral H. G. Bowen and Captain Lisle F. Small, U.S.N. Notables also present for the meeting included, Dr. Webster N. Jones, director of the college of engineering, Carnegie Institute of Technology, Conway P. Coe, U. S. commissioner of patents, Watson Davis, director of Science Service, Dr. George W. Lewis, director of the National Advisory Committee for Aeronautics and Dr. Frederick M. Fieker, dean of the school of engineering, George Washington University. While more military secrets are held by the engineers, research directors and college deans who are members of the council than by any other group they let out the interesting commentary that inventive volume runs inversely to the fortunes of war; be they good, the flow of inventions drops off but when we get into real trouble, inventions pour in. Mr. Kettering, always a inventions pour in. As usual, in affairs of this kind, Mr. Codrington put on a grand show for the Council at the Cleveland Diesel Plant and was their genial host at the Union Club.

AUTO-LITE

STARTERS · GENERATORS
BATTERIES
FOR DIESELS

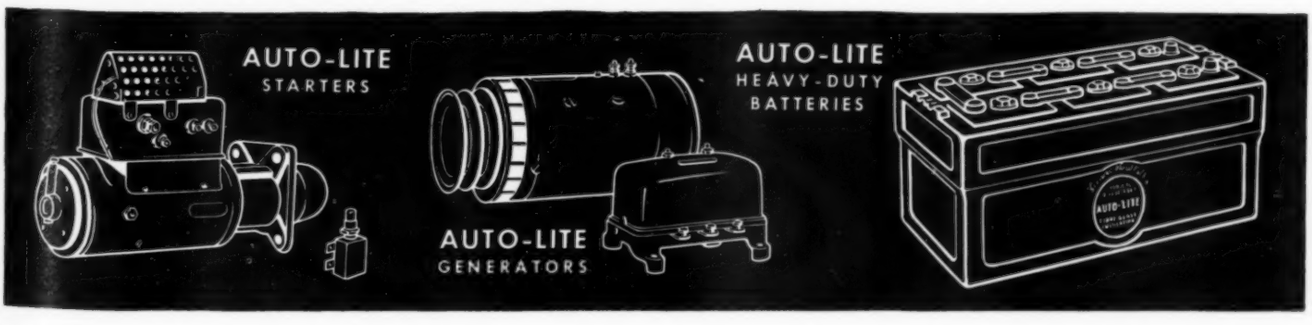
AUTO-LITE has applied to the development of electrical systems for Diesels the knowledge and experience gained through thirty-two years of building automotive electrical equipment. The dependability of these units is responsible in large measure for Auto-Lite's leadership as the world's largest independent manufacturer of automotive equipment.

Auto-Lite systems for Diesels are complete from generator to voltage control to battery to starter. These units are part of a long list of items Auto-Lite's 26 great manufacturing divisions are producing for America's Armed Forces on land, sea and in the air. Diesel manufacturers are invited to consult us on problems involving electrical cranking or generating equipment.

"KEEP BUYING" WAR SAVINGS BONDS AND STAMPS

AUTO-LITE *means* AUTO LIFE

THE ELECTRIC AUTO-LITE COMPANY
SARNIA, ONTARIO · TOLEDO, 1, OHIO



DAD-DRATTED DIESEL'S A NUT-KNOCKIN' BARN-BUILDING, COST-CUTTIN' CAT!

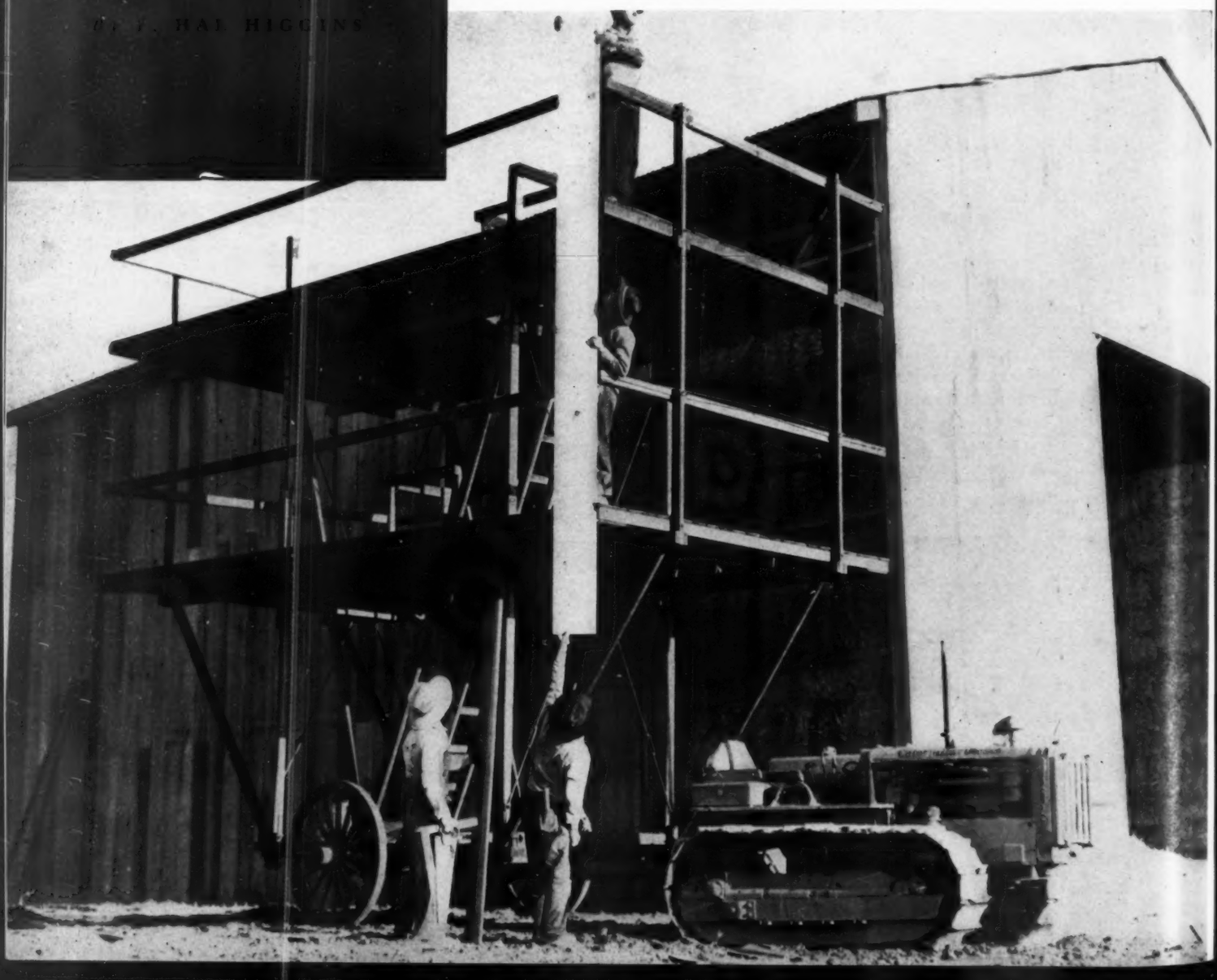
BY T. HAL HIGGINS

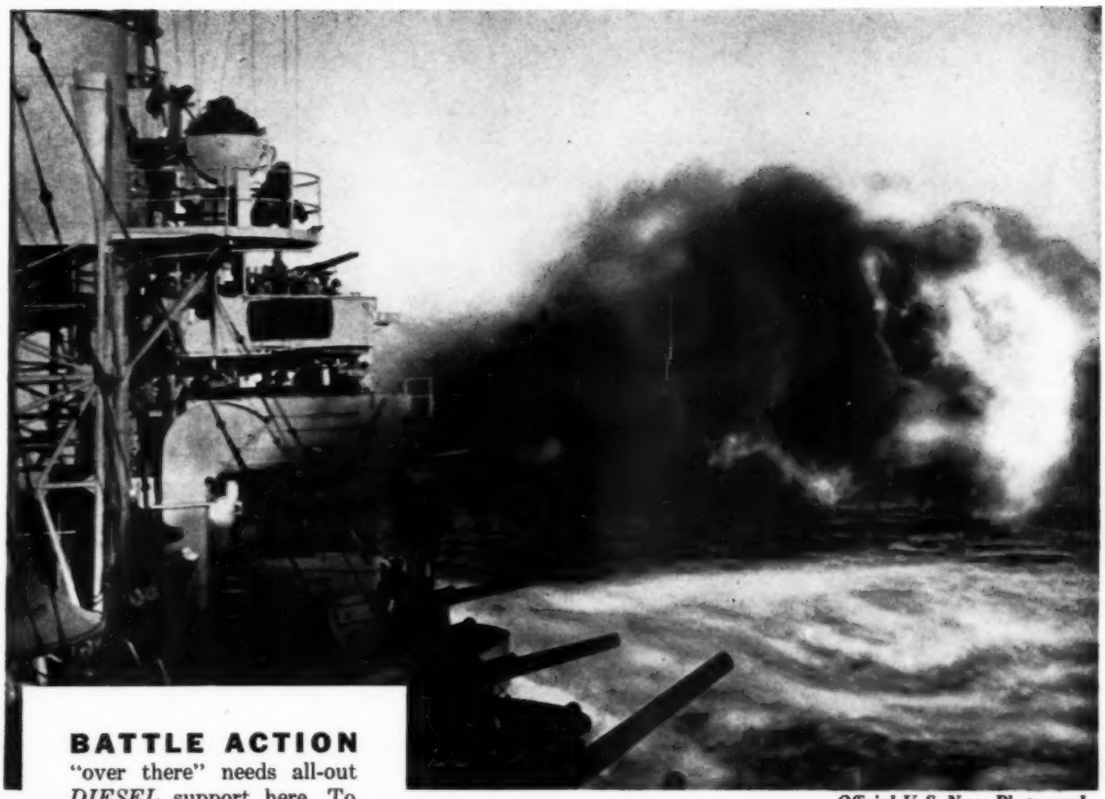
WESTERN farmers are fairly outdoing their traditional ingenuity to mechanize any job for cost-cutting by shaving both men and days off a job under war's demands for more food with less men. Here is a farm owned Caterpillar Diesel D4 caught in the act of building a barn over the baled hay pile at the end of harvest in half the time it would have taken had not the owner used his walnut-knocking tractor-drawn 2-level platform he had constructed to speed nut harvest just before he got to this job.

Take a look and you will note the construction on a pair of old wagon wheels abandoned years ago when horses gave way to tractors and trucks. In knocking off nuts a man with a pole stood on each of the two-story platforms on wheels and flailed the nuts from the limbs of the trees as the tractor drew the outfit between two rows of trees. Another man walked on the ground and knocked off the nuts from the lower limbs. Up to this the harvest of tree nuts and fruits had never given way to the machine as far as harvest was concerned, though this last fall, one or two tractors in the Sacramento were rigged up with aprons on the sides and a belt conveyor at the lower edge to catch prunes when the tractor shook them off the tree onto the aprons by vibrating the tree from its engine power.

In this case seen in the Santa Clara Valley, the barn was built in half the time it would have taken without the tractor to save scaffold building, etc. It also saved the baled hay from some of the early rains that would have cut its feeding value. In fact, the farmer didn't believe he would have found time and men to build this barn had he not had the trusty tractor handy after it had done a great cost-cutting job all year in producing a crop.

This 3-story trailer, hauled by a Caterpillar Diesel tractor goes through walnut orchards at harvest time while men perched on each level knock nuts off the trees. Between times the rigging doubles as a barn-building scaffold.



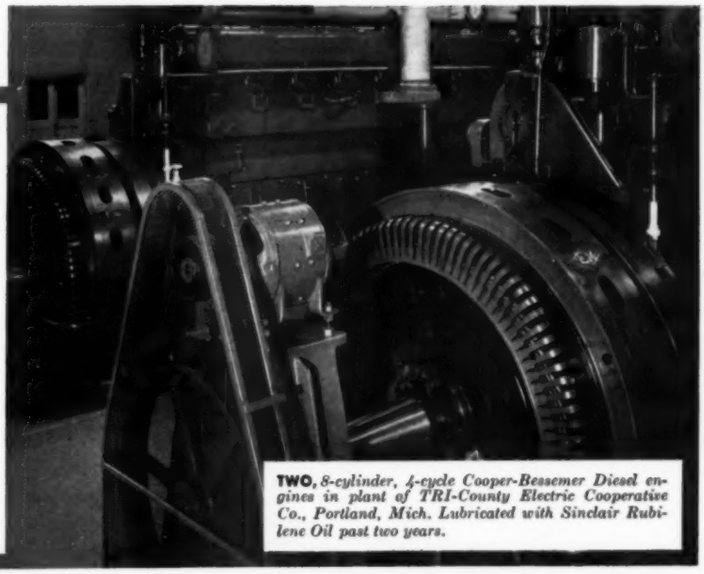


Official U. S. Navy Photograph

BATTLE ACTION "over there" needs all-out *DIESEL* support here. To maintain full designed engine output use . . .

. . . . . SINCLAIR RUBILENE OILS. Rubilenes have superior film strength to resist extreme pressures . . . high oiliness to prevent wear. They are non-corrosive, sludge-resistant, and keep rings clean, ports open in continuous heavy duty operation.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



TWO, *8-cylinder, 4-cycle Cooper-Bessemer Diesel engines in plant of TRI-County Electric Cooperative Co., Portland, Mich. Lubricated with Sinclair Rubilene Oil past two years.*

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.

"WARTIME PROBLEMS OF DIESEL MAINTENANCE"

By R. L. GREGORY*

RECENTLY while conversing with an inspector for one of the large nationally known Insurance Companies, he made this remark: "I have noted more REQUIRED MAINTENANCE on Diesel units, since our entry into the war, than I noted in all my previous years of inspection work."

This statement is significant in that it shows the trend of maintenance work to be upward, but when one stops to consider the great demands which have been placed upon the power facilities of the country, he can readily attest to the truth of such a statement. The speaker might have gone further without fear of exaggeration and stated that today there was more required maintenance on all types of power equipment than there had been for decades.

Power plant maintenance is dependent on several factors, but primarily upon the load demand on the plant, and the available equipment to handle that load, including the reserve capacity or standby equipment. A plant equipped with plenty of reserve units or capacity, operated upon a systematic schedule, will have less maintenance cost per unit than a plant which is limited in its capacity and is forced to operate its equipment at full rating or overload in order to keep up with the load demand. In many instances the plant maintenance costs in plants with plenty of available reserve, will be much less in total than the same cost in a plant with little reserve.

Prior to our entry into the conflict after Pearl Harbor, many communities were converting to Diesel Power for community needs. This was also true in many Industrial plants. Suddenly and with but little warning these plants found that the load demand was greatly increasing and that in order to keep apace of this abnormal growth it would be necessary to either purchase additional equipment, or be forced to crowd their present equipment beyond all normal operating conditions.

When it was decided to purchase additional equipment, many of these plants found themselves out on the proverbial limb. Diesel manufacturers had suddenly found that their product was in demand by various Government Agencies, who in order to pursue a course toward the satisfactory culmination of the war, had priorities on all available equipment. This left these manufacturers with no other alternative but to ignore private plants and owners of Diesel equipment until government requirements were met first. Not only did this situation affect the units proper, but it also affected replacement and repair parts. Metals and other raw materials used in the production of replacement parts were reallocated to other channels and immediately the plant with limited equipment was seriously up against a real problem in maintenance work.

Some of these plants were entirely transformed, their shops and foundries discontinued the manufacture of Diesels and Diesel equipment and they went into production on other lines of essential equipment. With such a situation existing, the personnel of these prewar plants found but one alternative, that of maintaining their present equipment to the best of their ability, using all the ingenuity they could muster up, and operating their units under adverse load conditions.

Others more fortunate, who made a practice of carrying a good supply of spare replacement parts, or plants which had plenty of reserve equipment were not as hard pressed and have for the most part weathered the storm to date. Still other plants furnishing power and light for industries producing essential war material were more fortunate and secured priorities which allowed them to procure replacement parts in due time.

However under any of the foregoing conditions, personnel in the various Diesel plants throughout the country have been faced with ever increasing maintenance problems. All plants have been forced to operate for longer periods with a minimum outage for maintenance, especially that maintenance of a preventive nature. The ultimate result of such conditions would be a natural increase in required maintenance, or maintenance which might be lessened if the proper outage time was available and materials could be ordered and received promptly.

How can a plant faced with such a situati remedy this condition? First by securing as hi a priority rating as possible from the Gove ment, all of which depends upon the essen requirements of the community which it serv

With this priority obtained, it is up to the pe sonnel in charge to go over the units with a fi tooth comb, ascertain the needed replacem parts to put and keep the units in proper ope ating condition, and then place orders f those parts, accompanied with the proper pr orities. The rate at which these parts can b secured will depend for the most part upo the priority rating obtained, and the ability the Manufacturer to procure the material f these parts. You must remember that he to is working on a priority basis and has to furni priorities in order to secure his material.

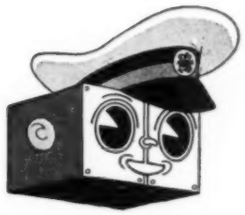
Finally when your repair parts are all on hand so arrange your operating schedule, that yo may take advantage of every period of lig load. This may mean working nights, mayb only for short periods, week ends and holida but power and light are essential to the welfa of every community, to the industrial plan shops and factories turning out equipment fo the pursuit of this conflict, and it is up t every man from the day laborer to the Super intendent to apply his best efforts in keepin our plants in constant operation. This ca only be accomplished by a concentrated effor of each of the plant personnel in doing hi part in the maintenance program, once th material is at hand and the proper opportunit for unit outage arrives.

Many other factors enter into the mainte nance problems of plants with overloaded equipment. Among the more important factor is fuel, lubricants, cooling agents and last bu not least plant and equipment cleanliness. Ou present day fuel for the most part is not up t the standard of the Diesel fuel of prewar day

Consequently more frequent inspection of the fuel handling equipment must be made in order to prevent sludge accumulations; and cleaning of tanks, pipe lines, etc., should be more frequent.

. . . *And now please turn to page 81* . . .

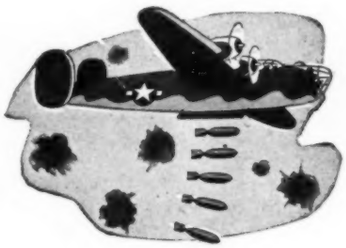
* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*



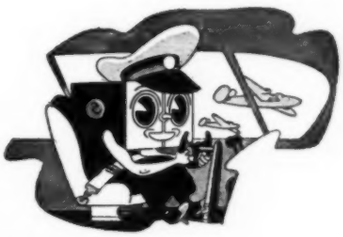
Song of Elmer...
the pilot who never gets tired

He holds no place in the Officer's Mess
for he does not sleep or eat,
He's the Quietest Birdman ever took
his place in a cockpit seat—
He joins no laughter, nor shoots the breeze,
nor whistles, nor hums, nor sings,
But he's flown more planes than any man
who ever wore pilot's wings...
...has Elmer!

He's an old, old hand, as old hands go
in a young man's game today,
For he circled the globe in 'Thirty-three
with Post in the Winnie Mae—
He's an Army man, he's a Navy man,
and he flies with the R.A.F.,
And the Yankees say, and the British say
of pilots, he's the best...
...is Elmer!



Often when bombers have levelled off
for the last tense bombing runs,
And the bomb-bay doors are opened wide,
and the gunners man the guns,
When the flak comes up as the bombs
go down, and the target zone is clear,
Then who is the pilot who holds the course
set by the bombardier...?
It's Elmer!



He can hold a plane on a chosen course
while the crewmen rest or sleep,
He can level off for a landing glide,
or bank her sharp and steep—
He can spiral up, he can spiral down,
or hold her level and true—
His hydraulic muscles never tire
the way human muscles do...
...not Elmer's!

And so bombing, transport, and cargo
planes, take Elmer on every flight
To spare the pilot and rest the crew
for emergency, storm, or fight—
He needs no rest, for he never gets tired,
being only a cold machine,
Just wheels and wires and gears and cogs,
with brackets and stuff between...
...is Elmer!

He wears no medals, he holds no rank.
Why should he? He cannot feel
The courage that flares in time of need
for he's only alloy and steel!
So when *nerve* is needed, the bombardier,
the pilots, the gunners, too,
The navigator, and all the rest,
are the boys who pull her through...
...NOT Elmer!

SPERRY

GYROSCOPE COMPANY, INC.

is proud to be manufacturing the famous Sperry Gyropilot for the Armed Forces of the United Nations.

Brooklyn, N. Y.
Division of Sperry Corporation

• *Reprints of this poem — suitable for framing, with signature removed — may be obtained without charge by writing the Sperry Gyroscope Company.*

Exchange Your Diesel Maintenance Ideas

PROPER MAINTENANCE OF DIESEL ENGINES WILL PAY HANDSOME DIVIDENDS

By ROY A. HUNDLEY*

Roy A. Hundley, A.B., graduate of Stanford University, Member S.A.E. with a wide and diversified background on Diesel design and engineering. He has been connected with The Enterprise Engine & Foundry Company for the past eight years and is an enthusiastic authority on Diesel engines.

NEVER before in the history of machinery and its operation has the maintenance factor been so vitally important. Even prior to the present emergency, extensive and complete maintenance programs were too frequently neglected, at the expense of high replacement costs. Formerly parts were readily available from the factory or service depot. Now, there is the possibility of not being able to obtain parts because of inability to obtain priority or allotment, but in many instances, if the part is manufactured from critical materials, such as aluminum, copper or alloy steels, the procurement of the part may be delayed because of allocations and allotments.

Today the operators of all machinery are facing this severe problem. It can best be minimized, and in many cases solved, by setting up a good, complete and comprehensive maintenance schedule. In addition, a proper educational program should be instituted on the subject of maintenance and operation for the benefit of those directly connected with the machinery.

To assist the operator of Diesel engines a few important points are brought out as suggestions in the following:

First and foremost, cleanliness cannot be overemphasized. To a large degree, the appearance of the engine and the engine room indicates the appreciation and care that the machinery has received. Have a place for all tools and equipment, see that they are clean, maintained, and in good working order for instant and ready use. All service lines should be kept tight and free of leaks, and all exposed metal surfaces should be painted or kept bright and not allowed to become rusty and dirty.

Secondly, all gauges and thermometers should be kept in good working order. Replace them when broken or worn out. It is from these instruments only that accurate indications of operating conditions can be obtained. It is advisable to occasionally have these instruments calibrated. If the engine is equipped with thermocouples and pyrometer, clean the thermocouple tips of carbon at regular intervals.

Thirdly, a tabulated routine, recording all maintenance functions, should be set up. This required "paper work;" however, by use of proper discretion and intelligent organization, a suitable record keeping system can be set up which will pay handsome dividends, for only by such records can maintenance be properly handled.

As a suggestion for routine maintenance, the following is presented as a guidepost. In all cases, however, the manufacturer's instruction book and maintenance schedules should be followed by operators without deviation:

HOURLY: All parts of the engine should be felt frequently to detect any excessive temperatures, particularly on the cylinder head and cylinder side covers. Level of the lubricating oil in the service tank should be observed and recorded. Watch for sudden gain or loss of level. Headings on all instruments should be noted and recorded. Turn the handles of cleanable type lubricating and fuel oil filters if such are installed in their respective systems.

DAILY (Every 24 hours): Open drain plugs of fuel and lube oil filters and tanks to drain out any water or sludge which may have accumulated. Bleed fuel, lube oil, and water systems of air.

WEEKLY (Every 60 hours): Check all external linkages, particularly governor and fuel linkages, for freeness of operation. Lubricate all of these moving parts.

MONTHLY (Every 250 hours): Remove inspection covers and check crankcase sump. Remove oil from sump and observe for condition and presence of water or sludge. If any is present, determine the cause. Check camshaft and valve gear. Observe freeness of operation and wear, if any.

EVERY SIX MONTHS (Every 1500 hours): Flush cooling system to remove any scale that may have accumulated. Observe condition and if found bad increase the frequency of the period of flushing. Clean heat exchangers and lubricating oil coolers. Inspect gear case and observe back lash of gears and radial and thrust clearance of timing gears.

ANNUALLY (Every 3000 hours): A general and thorough inspection of the entire engine, pulling at least one piston and cylinder head, should be made. Replace all worn parts, clean all parts thoroughly, and reassemble in accordance with the manufacturer's recommendations. Check packing glands of all pumps.

Every time that the engine is open for inspection or being worked on, the importance of cleanliness again cannot be overstressed. If service piping is removed, see that it is thoroughly flushed before it is used to conduct fuel, lube oil, starting air or water, to the engines.

By maintaining a schedule and following rules of care and operation religiously and specifically, even the most inexperienced operator can gain long trouble-free service from his equipment. However, the basis of proper maintenance is "To keep records." Recorded information enables your maintenance program to function successfully. It means longer non-stop performance of equipment, so vital now to bring this world war to its earliest possible conclusion.

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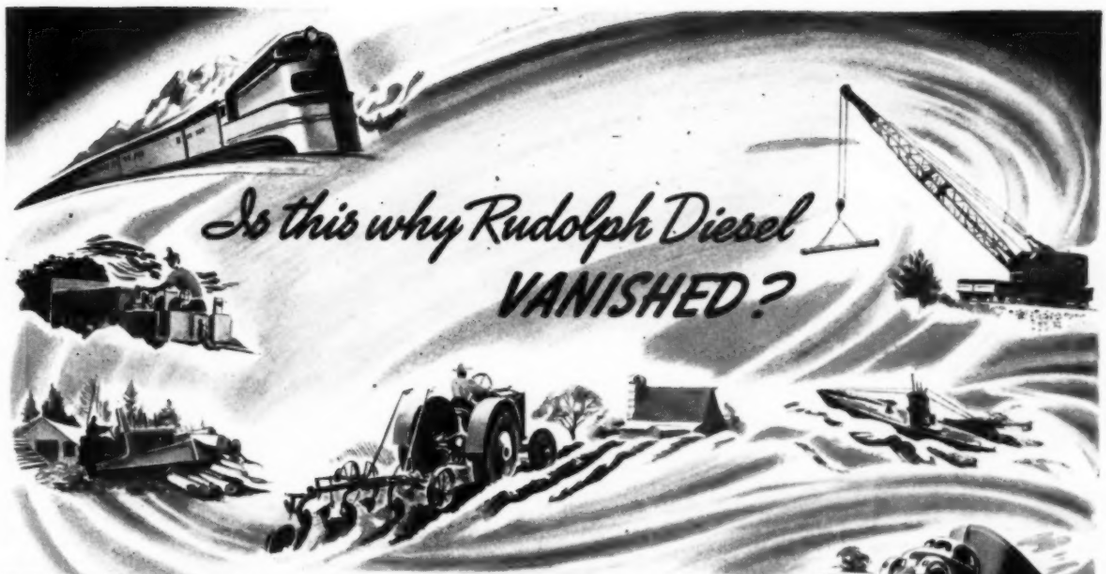
* *Chief Engineer Enterprise Engine & Foundry Company*



IT'S ONE of the unsolved mysteries of this century. On the passenger list of the Channel boat the night of September 29, 1913, was a famous name—Rudolph Diesel, creator of the now indispensible diesel engine principle. He came aboard, talked with friends, went to his stateroom. The Channel night closed in as the boat left Calais, got under way for Dover.

The morning sun illumined Rudolph Diesel's cabin, found it empty. Why? The mystery of his disappearance from the threshold of success has never been solved.

Did Diesel have hold of something too big for even his brilliant mind? Did it swirl through his head endlessly, the giant future of this brainchild of his—until the strain grew too great? Were the funds needed too colossal for his resources?

If this swirling, expanding vista of the future of diesel power was the reason that the world lost Rudolph Diesel, we can understand, a little. A little of his crushing burden of visualizing that future's demands . . . the endless problems to be solved in linking diesel power to the countless places it could serve.

For today, that future of the diesel's usefulness is still a giant. And we, as part of it, must satisfy the present as well. A present that calls for generator units for the Signal Corps and Army Engineers, auxiliary engines for the Navy, power for our armed forces on every world battlefront . . . all built as fast and well as we know how.

That leaves little time for the future. You can help us make that time useful by giving a fraction of *your* time. To tell us of your plans, and how Diesel Power may help. 5 horsepower or 2000. Rogers Diesel and Aircraft Corporation, 1120 Leggett Avenue, New York 59, N. Y. *Divisions:* Hill Diesel Engine Company, The Edwards Company, Edwards Aircraft Products, Inc., Ideal Power Lawn Mower Company.

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Diesel Engines, 5 to 2000 h. p. » Gasoline Engines » Generator Sets
Generators » Power Units » Switchboards » Pumping Units
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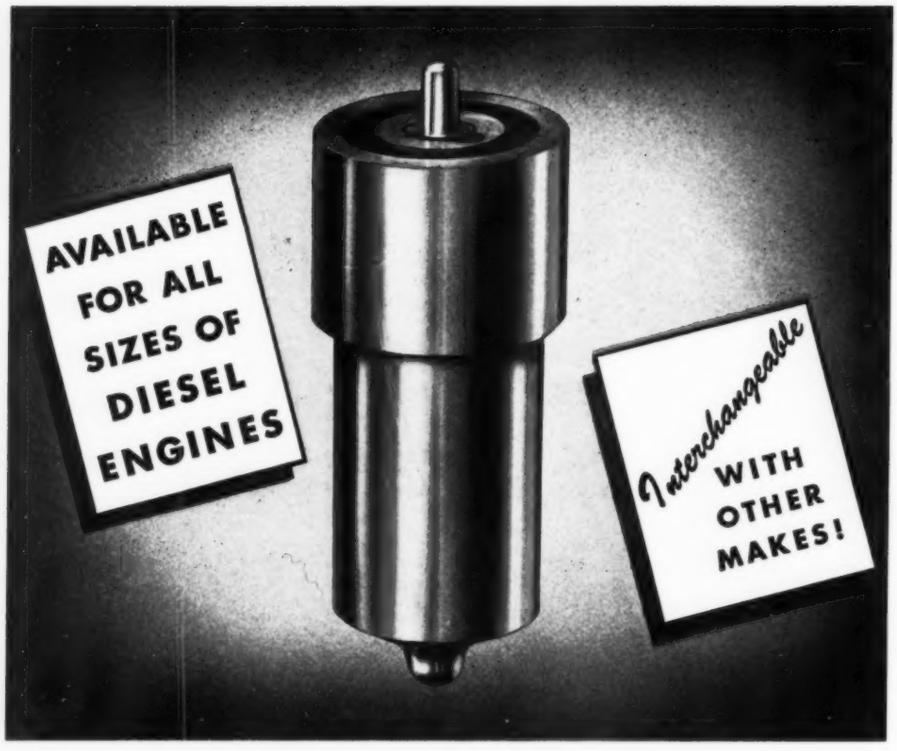
DEMCO INDIVIDUAL NOZZLES



DEMCO Individual Nozzles present the latest design achievements known to the fuel injection field. They incorporate improved workmanship and the ultimate in precision. Modern manufacturing facilities of DEMCO guarantee the longest possible carbon-free operation and freedom from dripping.

• • •

NOTE THESE DEMCO FEATURES:

DEMCO nozzles are interchangeable with other makes, providing unmistakeable convenience and economy.

They are available in these all-inclusive sizes—shank diameters of .547", .700", .900"—a size for every diesel engine.

• • •

NO DELAYS! You will receive prompt delivery on all model DEMCO NOZZLES.

Write for complete information.

DEMCO

DIESEL ENGINEERING & MANUFACTURING CORP.

200-214 NORTH LAFLIN STREET • CHICAGO, ILLINOIS

Large Engine Order to Nordberg

NORDBERG Manufacturing Co. was recently awarded an order for the propelling engines for seventy-five 4000 ton ships to be used for coastwise service.

In each ship there will be installed a 6 cylinder, two cycle engine with a bore of 21½ in. x 29 in. and when running at 180 rpm. will develop 1700 shaft horsepower. These engines are arranged for direct drive to a single propeller. The engines are of the same cylinder size and have the same number of cylinders as the 92 engines Nordberg has built or is building for U. S. Maritime Commission C-1 ships.

In the C-1 cargo ships there were two engines driving a single propeller through electric couplings and a gear reduction set. Because there is a single engine installed in these coastwise ships, there is naturally some difference in the control arrangement. The speed has been reduced from 220 rpm. as it is in the cargo ships to 180 rpm. for these coastwise vessels.

Elliott-Buchi Turbochargers Described

THE latest refinements in Elliott-Buchi turbochargers for four-cycle Diesel engines are presented in a generously-illustrated 16-page brochure, Bulletin M-5, which has been prepared by the Supercharger Department of the Elliott Company, Jeannette, Pa.

The applications of the Buchi System of turbocharging to both air and solid injection engines, as well as to low-, medium-, and high-speed engines, are covered in some detail.

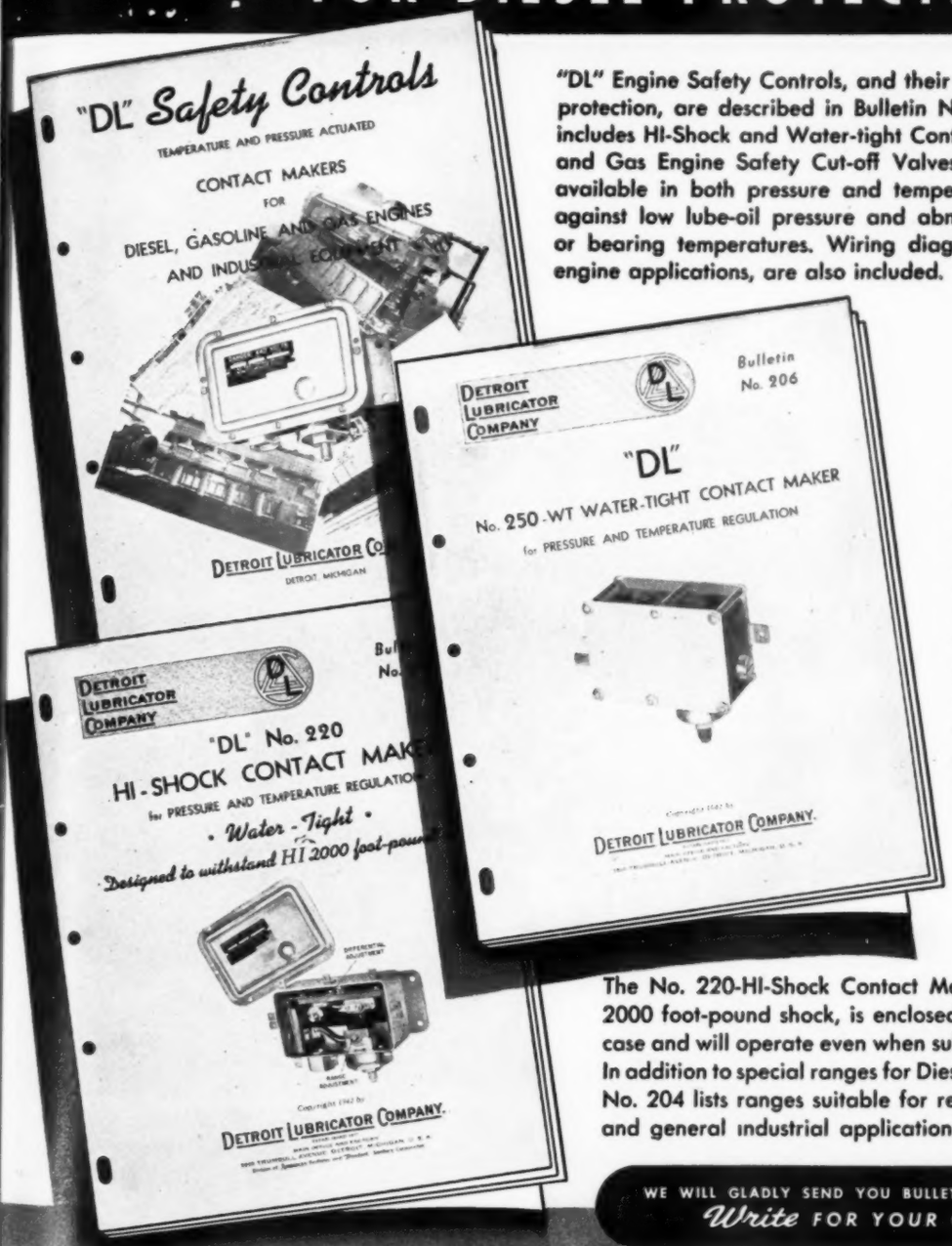
Cutaway views in color are used to illustrate features of turbine, blower, air inlet silencer and the water-cooled, self-contained lubricating system of the turbocharger unit.

Representative four-cycle Diesel engines equipped with Elliott-Buchi turbochargers are also shown and discussed in text and pictures.

Tuthill Pump Announces Changes in Personnel

G. B. TUTHILL, president and treasurer of Tuthill Pump Company, Chicago, has just issued an announcement of changes in the administrative organization of the company. H. T. Kessler, formerly vice-president, has been appointed executive vice-president and general manager. W. D. Caldwell, controller, becomes assistant treasurer, retaining the duties of controller; and Jess Tharp has been appointed works manager.

Here's the Complete Story ON CONTROLS FOR DIESEL PROTECTION



"DL" Engine Safety Controls, and their application to Diesel engine protection, are described in Bulletin No. 203. This line of controls includes HI-Shock and Water-tight Contact Makers, Solenoid Valves and Gas Engine Safety Cut-off Valves. "DL" Contact Makers are available in both pressure and temperature types, for protection against low lube-oil pressure and abnormally high cooling water or bearing temperatures. Wiring diagrams, covering all types of engine applications, are also included.

Bulletin No. 206 describes the No. 250-WT Contact Maker and lists all available pressure and temperature ranges, not only for use as Diesel protective devices, but for refrigeration, air conditioning and industrial applications. The No. 250-WT is designed for use where conditions of drippage or spray may be encountered.

The No. 220-HI-Shock Contact Maker, designed to withstand 2000 foot-pound shock, is enclosed in an all metal waterproof case and will operate even when submerged in 25 feet of water. In addition to special ranges for Diesel engine protection, Bulletin No. 204 lists ranges suitable for refrigeration, air conditioning and general industrial applications.

WE WILL GLADLY SEND YOU BULLETINS No. 203, 204 AND 206
Write FOR YOUR COPIES TODAY

DETROIT LUBRICATOR COMPANY

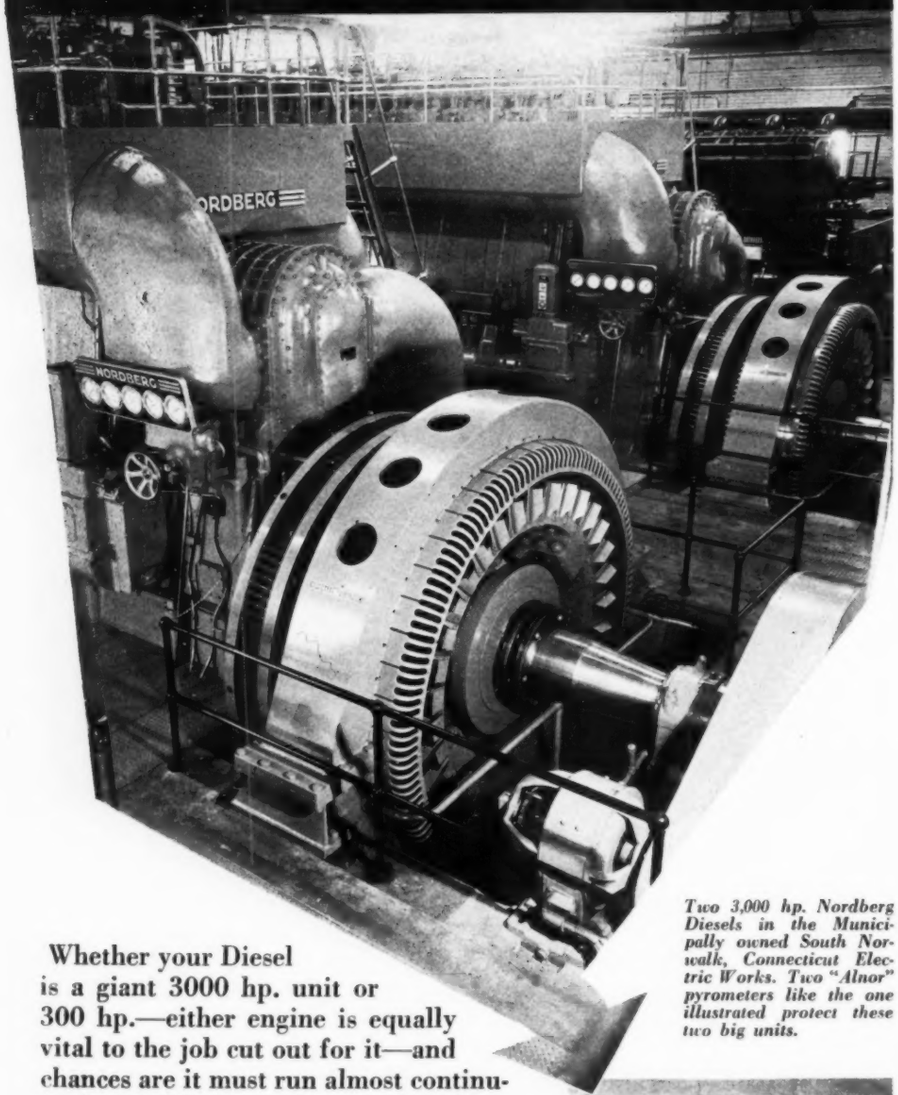
General Offices: DETROIT, MICHIGAN

Division of American Radiator and "Standard" Sanitary Corporation

Canadian Representatives—RAILWAY AND ENGINEERING SPECIALTIES LIMITED, MONTREAL, TORONTO, WINNIPEG

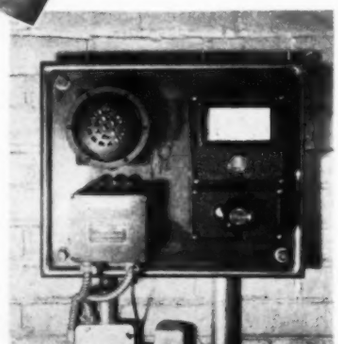
"DL" Heating and Refrigeration Controls • Engine Safety Controls • Safety Float Valves and Oil Burner Accessories • Radiator Valves and Balancing Fittings • Arco-Detroit Air and Vent Valves • "Detroit" Expansion Valves and Refrigeration Accessories • Air Filters • Stationary and Locomotive Lubricators

It's all the same to "ALNOR"—



Two 3,000 hp. Nordberg Diesels in the Municipally owned South Norwalk, Connecticut Electric Works. Two "Alnor" pyrometers like the one illustrated protect these two big units.

Whether your Diesel is a giant 3000 hp. unit or 300 hp.—either engine is equally vital to the job cut out for it—and chances are it must run almost continuously at full output—these days. Either engine must be regularly checked for individual cylinder performance—the slightest variation from normal is a danger sign—pointing to an immediate and usually minor adjustment that may save hours—even days of costly shutdowns. It's all the same to "Alnor"—the pyrometer that protects big and little Diesels alike—and at nearly the same cost.



Specify and Buy "Alnor"

Illinois Testing Laboratories Inc.

423 NORTH LaSALLE STREET, CHICAGO, ILLINOIS

MANUFACTURERS OF "ALNOR" AND PRICE INSTRUMENTS · PRODUCTS OF 43 YEARS' EXPERIENCE

Tom Collins Rejoins Cummins Engine Co. As Regional Manager

ON leave of absence for the past year in performance of a special assignment for one of the country's largest motor freight lines, Tom Collins has rejoined the Cummins Engine Company, manufacturers of Cummins Diesels, in his former capacity of manager of the company's Pacific Southern Region.

Announcement of Collins' return, welcome news to his host of friends among west coast Diesel operators, was made by P. E. Letsinger, vice-president in charge of distribution, at Columbus, Indiana, site of the company's factory and general offices. According to this announcement, Collins will make his headquarters at the new regional offices which have been established at 411 W. Fifth Street, Los Angeles.

Tom Collins

Collins is a veteran member of the Cummins sales organization. He first became connected with the company, several years ago, as a sales representative of the Cummins dealer in Seattle. His work here later led to his appointment as manager of the Central Region, with offices in Cleveland, Ohio. From Cleveland he was transferred to the west coast as manager of the Pacific Southern Region, with headquarters then located in Phoenix.

Approximately one year ago, Collins temporarily left the company to undertake a special project for Pacific Freight Lines, whose fleet of Cummins Diesel trucks constitute one of the nation's most extensive highway truck transport systems.

"We make Parts for the Big Boys, too!"

McQUAY-NORRIS
ALTINIZED
PISTON RINGS

For several years, McQuay-Norris parts have been contributing their precision and stamina to Diesel engine performance. And because McQuay-Norris always keeps pace with Diesel developments, our work in this field is constantly expanding. More and more, Diesel manufacturers are availing themselves of our clinical research, our engineering and technical experience. McQuay-Norris products are backed by thirty-three years' experience in making precision parts for the transportation field — cars, trucks, tractors, airplanes and ships. Send us your blueprints.

McQUAY-NORRIS MFG. CO.

TIME TESTED McQUAY NORRIS AUTO PARTS PROVEN IN SERVICE

ST. LOUIS, MO.

PRECISION WORKERS IN IRON, STEEL, ALUMINUM, BRONZE, MAGNESIUM

American Merchant Marine Conference October 14-15

WITH its key-note geared to planning the transition of American Shipbuilding and Shipping From War to Peace, the American Merchant Marine Conference will be held October 14th and 15th at the Waldorf-Astoria in conjunction with the Seventeenth Annual Meeting of the Propeller Club of the United States.

Rear Admiral Emory S. Land, head of the War Shipping Administration and Chairman of the United States Maritime Commission will deliver the principal address at the Annual Dinner October 15th and Rear Admiral Howard L. Vickery, Vice Chairman of the Maritime Commission, will be the presiding officer at the Annual Meeting of the American Merchant Marine Conference which will convene earlier the same day.

As in past years, panel discussions will be a feature of the conference with matters of importance to the industry receiving special attention by various groups under the guidance of chairmen chosen for their experience. Among the outstanding personalities who will conduct the panel on the Training Program will be Edward F. Kaiser, who has accomplished outstanding results on the West Coast in this difficult branch of the war effort.

Panel Discussions Which Will Be Held October 14th-15th, Will Include

FEDERAL LEGISLATION—R. J. BAKER, *Chairman,* Secretary of the American Merchant Marine Institute, Inc.

TRAINING PROGRAM—CAPTAIN EDWARD MACAULEY, *Chairman,* Member, United States Maritime Commission

STEVEDORING & CARGO HANDLING—JOSEPH P. RYAN, *Chairman,* President, International Longshoremen's Association

PUBLIC RELATIONS—TOM BECK, *Chairman,* President, Crowell-Collier Publishing Company

MARITIME SAFETY—B. O. PICKARD, *Chairman,* Waterfront Employers Association of the Pacific Coast

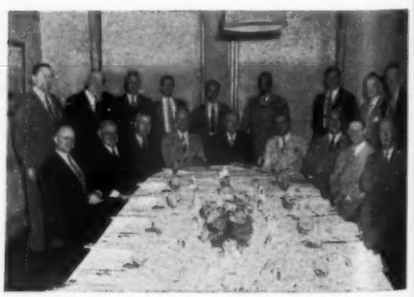
FINANCE—L. D. PARMELEE, *Chairman,* Executive Vice President, AGWI Steamship Lines, Inc.

MARINE INSURANCE—HENRY REED, *Chairman,* President, Insurance Co. of North America

EDUCATION OF MARINE WORKERS—EDGAR F. KAISER, *Chairman,* Vice President, Permanente Metals, Inc.

AIR TRANSPORT—JOHN E. SLATER, *Chairman,* Executive Vice President, American Export Lines, Inc.

DIESEL ENGINE PROPULSION IN THE POST WAR ERA—A. R. MCMULLIN, *Chairman,* Nordberg Manufacturing Company.



Conference Committees in session at the Whitehall Club on Tuesday, August 31st—Front row—reading left to right: Lewis L. Smith, Benn Barber, Harmon Lewis, O. B. Whitaker, John F. Gehan, Arthur M. Tode, Ralph R. Piper, John G. Thompson, Edward J. Keane. Rear row—reading left to right: Oscar F. Dupont, D. H. Primrose, Melvin L. Goodman, Alfred Conhagen, Charles Files, Julius C. Manzi, Louis Weickum, Carl F. Vander Clute, William D. Archibald.

Lessons From The War

From our wartime experience we can say this: When peace comes, Americans will enjoy the comfort and convenience of many strange new devices which are today devoted to military purposes. They will not only extend our span of life but also make it pleasanter in many ways. The 4-plant facilities of The Weatherhead Company are prepared to help you build these peacetime products just as we've helped build America's cars, planes and refrigerators in the past. We offer you better designing than ever, lowered production costs and a highly efficient service organization.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO
Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

Ability To Tow Anything Afloat

The U. S. Maritime Commission V-4's, among the world's largest ocean-going tugs, are powered with twin DMQ-36 Enterprise turbo-charged Marine Diesel Engines. They feature dual engine drive through electric couplings and single reduction gears. These heavy duty, dependable Enterprise four-cycle Diesel Engines give the V-4's the stamina and ruggedness for the successful completion of countless tasks where the going is toughest. Enterprise Diesel Engines were the logical choice of the Maritime Commission, adequately fulfilling their horsepower requirements . . . an esteemed tribute to advanced engineering and design that will be available to commercial operators in the post-war period.

ENTERPRISE ENGINE & FOUNDRY CO.

SAN FRANCISCO
SEATTLE

Enterprise MARINE DIESEL POWER

WASHINGTON, D. C.
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SHIPS FOR VICTORY

Battles won by Auxiliaries are Important, too!

EMERGENCY fire control is only one of the many important jobs which the Navy entrusts to the dependable power of Diesel auxiliary engines; jobs in which failure might mean the loss of a ship—the loss of a battle.

As a part of Diesel-powered water pumpers, generators, and other aboard-ship auxiliaries—Ex-Cell-O fuel injection equipment is really playing an essential part in the success of Diesel power at war.

A feature of the Ex-Cell-O Type KB Fuel Injection Pump is automatic timing. It provides for maximum power output and minimum fuel consumption at all speeds by advancing injection according to engine rpm. Illustrated at right above, is Ex-Cell-O Type KD Pump for either constant or variable speed application where automatic timing advance is not required.

Ex-Cell-O precision nozzles, available to Diesel engine builders for original equipment and replacement, combine simplicity with freedom from leakage and stickage, and protection for working parts. There are designs for various types of aircraft, automotive, marine, and stationary Diesel engines.

XLO

For complete details of Ex-Cell-O Fuel Injection Pumps and Nozzles, Diesel engine builders should write to Diesel Division of Ex-Cell-O Corporation, 1200 Oakman Boulevard, Detroit, Michigan.

EX-CELL-O

FUEL INJECTION EQUIPMENT

Diesel Speed Supplies to Russia

THE September 16th edition of the New York Times carried a wireless dispatch from James B. Reston dated at London, Sept. 15 setting forth one of the virtues of Diesel locomotives little thought of in this country but which is a boon to our men who are bending every effort to deliver supplies to Russia under most difficult conditions. Mr. Reston wirelessed in part: ". . . Substitution of Diesel engines for steam engines on the railroads also is helping to overcome some natural disadvantages of the Iran railroad, which never was intended to carry anything like the weight of material that now is moving across Iran's mountains. In one mountainous stretch of railroad 125 miles long there are more than 109 tunnels—United States soldiers call it 'the IRT'—and in the cabs of the steam engines temperatures as high as 190 degrees have been measured.

"The problems of operating in this heat are so great that United States Army officials had to call for Diesel engines, which do not generate so much heat, and while this has given our men some relief, there is apparently little that can be done to deal with the normal heat at the Persian Gulf where our men are unloading ships and assembling trucks and loading them with war supplies in temperatures usually around 140. . . ."

V-Loan for Elliott Company

A $7,000,000 V-loan has been approved for the Elliott Company, Jeannette, Pa., by the Navy Department, and will be handled by the Guaranty Trust Company of New York with New York and Pittsburgh banks participating, announces G. B. Shipley, Elliott Company president and chairman of the board. The loan has been granted to provide additional working capital for further expansion of war production contracts.

The banks participating in the loan are the Guaranty Trust and Bankers Trust Companies of New York and the Union Trust and Colonial Trust Companies of Pittsburgh, Pa. The loan matures July 31, 1945.

The Elliott Company manufactures electrical equipment, such as generators, motors and motor-generators; and such prime movers as steam turbines and engines. Many other items of power plant equipment, as well as superchargers for Diesel engines and industrial process equipment, are also products of the company.

The Truck That Swims

and in the amphibian truck are parts made of

ArmaSteel*

On the highway or the high waves, the Army's newest military vehicle — the "Duck"—is equally at home. Already it is winning combat-zone acclaim for its all-round service as troop transport, military land truck and landing barge.

The use of ArmaSteel in amphibian trucks demonstrates the ever-increasing application of this versatile metal to replace critical steels and alloys. While satisfying the requirements for heavy-duty wear, exceptional ruggedness and resistance to shock, ArmaSteel castings have effected substantial savings in materials, machining time and tool wear, with a corresponding increase in production. Let us show you how ArmaSteel can solve problems for you . . . both in today's production and in tomorrow's peacetime manufacturing.

SAGINAW MALLEABLE IRON
DIVISION OF GENERAL MOTORS
Saginaw, Michigan

LET'S HAVE A HOME FRONT OFFENSIVE

BOOST BOND SALES

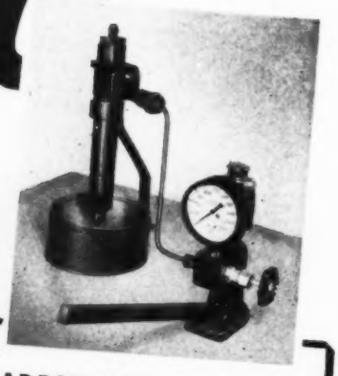
★

*Reg. U. S. Pat. Off.

CAST FOR A LEADING ROLE IN INDUSTRY

ADECO

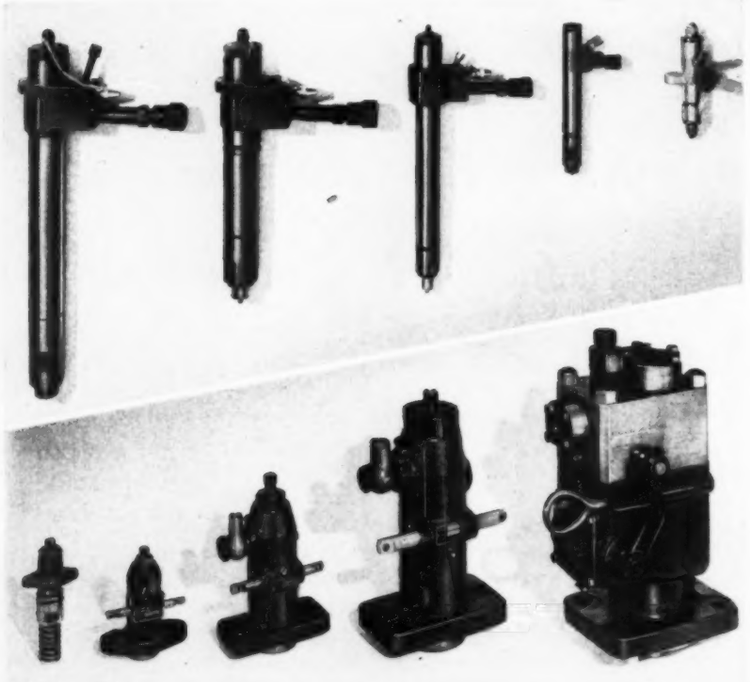
DEPENDABLE DIESEL FUEL INJECTION EQUIPMENT



ADECO NOZZLE TESTER
For Economical Maintenance

America's most widely used Nozzle Tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors. Avoids costly delays and possible damage to engine. Best for economical maintenance. Write for new illustrated bulletin.

Throughout the diesel industry, Adeco stands for the finest in fuel injection equipment. Years of experience in pioneering equipment for America's diesel needs have resulted in an outstanding line of fuel injection pumps, nozzles and nozzle holders. Today's performance of this dependable equipment merits your confidence for to morrow's requirements.



AIRCRAFT & DIESEL EQUIPMENT CORPORATION
4401 North Ravenswood Avenue • • • • Chicago, Illinois

Fitz Named Sperry Advertising Chief

JUSTIN A. FITZ, who has been connected with the Sperry Gyroscope Company for the past 26 years, has been appointed advertising director of the company with headquarters at Brooklyn.

Mr. Fitz has had a distinguished career with the Sperry Gyroscope Company, pioneers and leaders in the instrument manufacturing field, and was selected by the company to supervise the installation of the navy gyro-compass test room for the Russian Government at Leningrad in 1929. During his long Sperry service, Mr. Fitz made several trips abroad in connection with his company's marine overseas activities.

During the first 13 years of his service with Sperry, Mr. Fitz filled a number of official positions in the marine department and subsequently handled the advertising and public relations activities of the Gyroscope Company, including the publication of the company's quarterly magazine, the "Sperryscope." Sperry's new advertising director, who is a native of Massachusetts, is a member of the Institute of the Aeronautical Sciences, the Propeller Club, the Advertising Club of New York, the Explorers Club, and the National Press Club.

The Ready-Power Company Becomes a Michigan Corporation

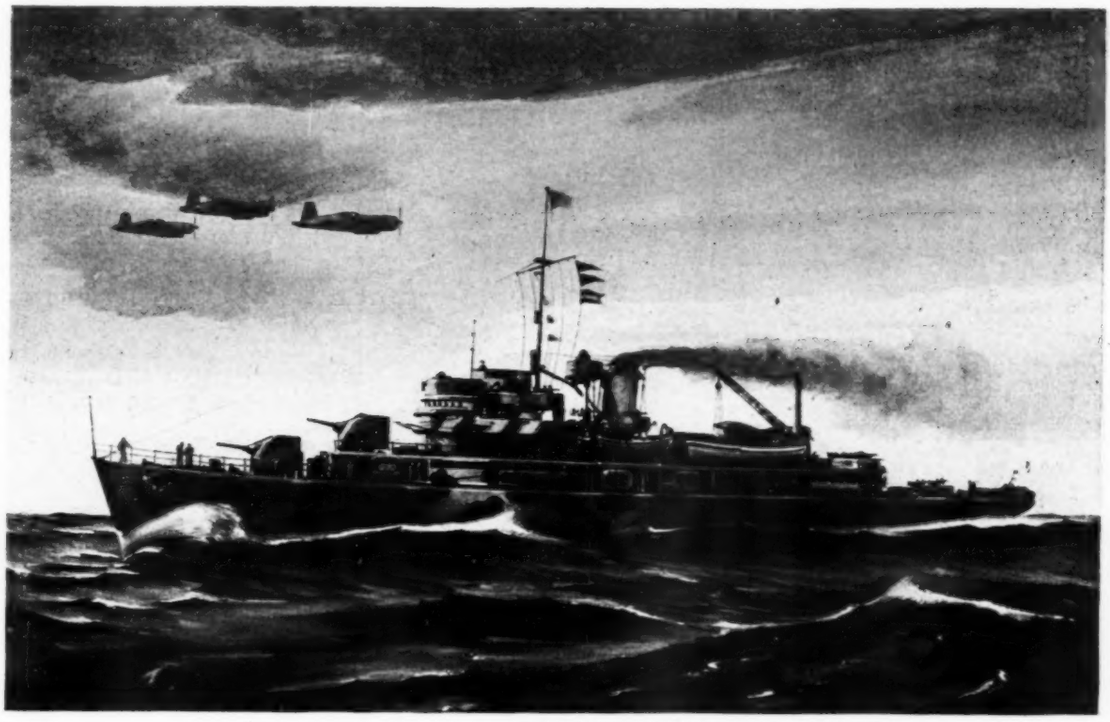
AS a result of the greatly increased volume of business arising out of the Ready-Power Company's participation in the war effort, the organization of The Ready-Power Company has been changed from the individual "doing business as" to The Ready-Power Company—incorporated in Michigan.

Organized in 1924 by Harold D. Gumpper and carried on as an individual enterprise since that date, this company which manufactures Ready Power units for electric industrial trucks and gas and Diesel engined electric plants for all power needs, had a steady growth until the defense program and the active participation in the war called for greatly increased production and new plant facilities.

This expansion program was largely completed before incorporation. In order to handle the increased business, however, the corporate form of organization, as outlined, has been instituted. "The manufacture of Ready-Power units for electric trucks will be continued at the Ready Power Division, 3826 Grand River Avenue, and the manufacture of gasoline and Diesel electric plants by the Power Plant Division, 11231 Freud Avenue, as in the past," stated Mr. Gumpper, president.

WHAT!

FLUID DRIVE A SEAPLANE TENDER?



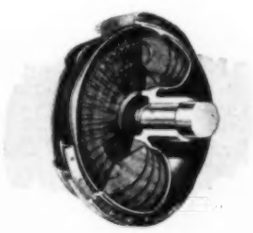
American Blower Fluid Drives enjoyed widespread acceptance in many fields before the war. Now production is devoted exclusively to war needs. This U. S. Navy Seaplane Tender is but one of many types of navy craft and merchant marine ships equipped with American Blower Fluid Drives.

YES, this U. S. Navy Seaplane Tender is equipped with American Blower Fluid Drives. So are numerous other U. S. navy craft and merchant marine vessels.

Fluid Drives prevent transmission of torsional vibrations and shocks from powerful Diesel engines to delicate machinery. They synchronize multiple engine speeds and permit rapid clutching and de-clutching.

We're proud of the peacetime performance and the wartime records of American Blower Fluid Drives. We're proud, too, the U. S. Navy, Army and Maritime Commission entrusted us with the building of Fluid Drives for the war effort. Building more and more Fluid Drives for navy craft, cargo vessels and army planes is our foremost duty now.

After victory all the progress we've made under pressure of war, our complete facilities for building Fluid Drives, heating, ventilating, mechanical draft, air handling and air conditioning equipment will be ready to again co-operate with other industries in the creation of a new and better way of living in a free world.



Cutaway view of American Blower Fluid Drive. There is no mechanical connection between driving and driven members.

ARMY E NAVY
For excellence in production.

AMERICAN BLOWER

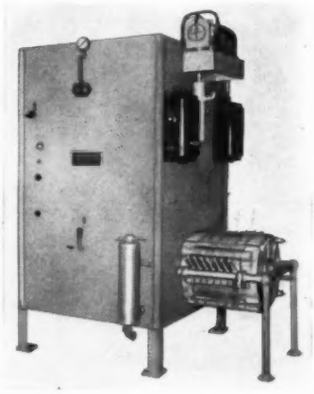
AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator and Standard Sanitary Corporation

AMERICAN BLOWER

New Hilco Airline Oil Purifier

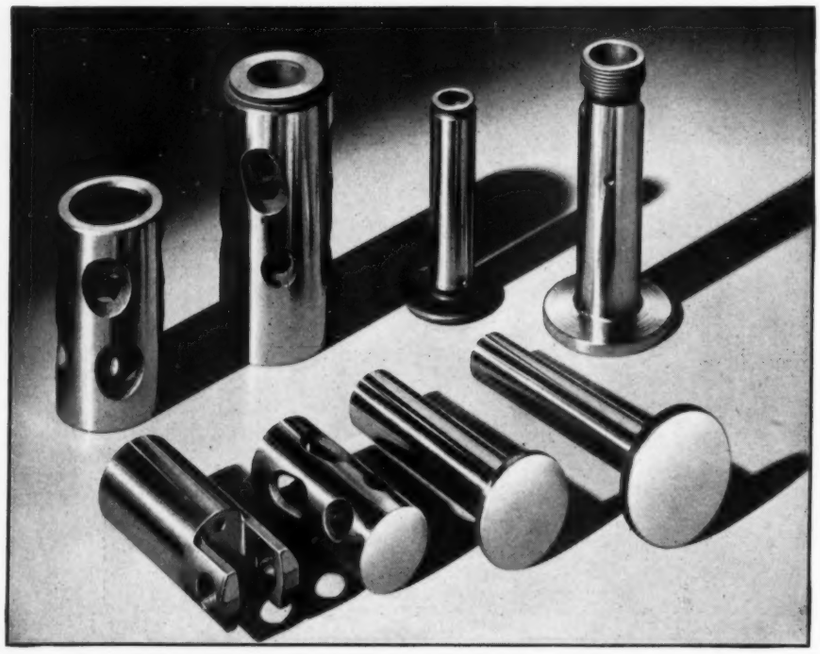
THE Hilliard Corporation announces the addition of new units to its line of Hilco Airline Oil Purifiers. These oil purifiers were primarily developed for the purification of aircraft engine lubricating oil, which, of course, must be reconditioned to the full value of the original new oil. However, the equipment finds wide application in the purification of many other types of oil, such as used in automobiles, trucks, tractors, Diesel engines, gasoline engines, steam turbines, steam engines, Diesel locomotives, vacuum pumps, gas engines, hydraulic presses, air compressors, and many other industrial lubricating oils. The equipment is very satisfactory for the purification of insulating oils such as used in transformers and circuit breakers.

Operation consists of drawing the batch of oil to be purified into the heater tank, into which is also introduced Hilite, an efficient grade of fullers earth, or activated clay. This entire mixture is thoroughly agitated and heated for drying off all traces of water, moisture and fuel dilution. The Hilite acts to absorb all solids, such as carbon, tarry matter, abrasives and acids. After heating, the mixture is dropped into a rundown tank, and then by means of compressed air, the mixture is forced into a filter press, where all solids are retained. Then the oil again passes through a secondary filter press, which doubly assures the removal of all solids. The unit shown is the Model A-50, and has a capacity of 50 to 65 gallons per batch per hour. Units having the same appearance are available in capacities of 75 to 130 gallons per batch per hour, and special units of larger capacity are also available.



Model A-50 Hilco Airline Oil Purifier

Further information on Hilco Airline Oil Purifiers is available by writing The Hilliard Corporation, 314 West Fourth Street, Elmira, N. Y.



"CHICAGO"

VALVE TAPPETS FOR DIESEL ENGINES

Steel Mushroom and Cast Iron Ported Type

Present day conditions demand "front line" efficiency of your Diesel!

An untold number of Diesels are giving consistent and effective service —day and night—all over the world—meeting the toughest **service demands** with **Chicago Tappets.**

ARMY E NAVY

We are specialists in the manufacture of Valve Tappets, Connecting Rod Bolts, Valve Spring Retainers—all to **Aircraft Quality Standards.**

THE CHICAGO SCREW CO.

ESTABLISHED 1872

1026 SO. HOMAN AVENUE CHICAGO, ILL.

Fetzer of Mack Gets OPA Post

APPOINTMENT of Albert C. Fetzer, vice president of Mack Manufacturing Corp., as a member of the OPA truck manufacturers advisory committee has been announced by the office of Prentiss M. Brown.

First order of business to be studied by the new committee, according to Mr. Fetzer, will be amendments to the used truck price ceilings. In addition the group will advise the OPA on other existing and proposed truck pricing regulations.

Membership of the committee of 18 men includes representatives of the major truck, bus and trailer manufacturers. Meetings of the group in Washington are expected to coincide with sessions called for WPB's truck industry advisory committee. Mr. Fetzer has been with the Mack company since 1911.

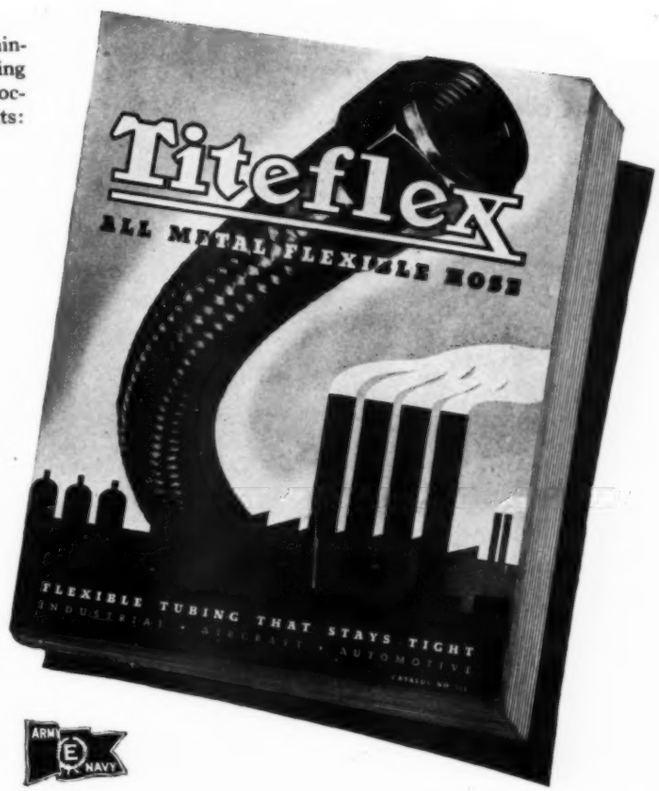
TITEFLEX ANNOUNCES

A *NEW* ILLUSTRATED MANUAL ON *FLEXIBLE, ALL-METAL* TUBING!

Invaluable to design, production and maintenance engineers using or contemplating the use of flexible tubing in products or processes. Following is a partial list of contents:

- . . . Design procedure for vibration and flexing applications
- . . . Recommended pressures and temperatures
- . . . Minimum bending radii
- . . . Data on all types of fittings available
- . . . Instructions for attaching fittings
- . . . Recommended sizes, and typical assemblies, for all industrial applications
- . . . Photographs showing correct application of TITEFLEX on all types of equipment . . . for conveying steam, liquids, gases, for conduit, etc.

A copy of this helpful manual will gladly be sent to engineers or manufacturers on request. Write for your copy today.



Titeflex REG U S PAT OFF.

METAL HOSE CO.

517 FRELINGHUYSEN AVENUE, NEWARK 5, NEW JERSEY

RADIO, POWER, AND IGNITION SHIELDING — HIGH PRESSURE FUEL, OIL, AND AIR LINES — CONDUIT, FITTINGS, COMPLETE ASSEMBLIES

R. J. MINSHALL, PRESIDENT; J. P. STEWART, ASSISTANT GENERAL MANAGER OF McCULLOCH ENGINEERING CORP.

R. J. Minshall, left, and J. P. Stewart, recently appointed president and assistant general manager respectively, of McCulloch Engineering Co.

THE appointment of R. J. Minshall as president of McCulloch Engineering Corp., Milwaukee, by the board of directors was announced today by Robert McCulloch, founder of the supercharger manufacturing plant who is resigning effective immediately (September 1) to undertake a new development vital to the war effort.

Mr. McCulloch stated that the plant will continue to operate as a self contained unit with the same personnel at its present site under the management of Minshall and James P. Stewart, Jeannette, Pa., who was named assistant general manager. The total output, now devoted to war production of superchargers for two and four cycle Diesel engines and gasoline motors, will be maintained in the Milwaukee plant without change in production. Peacetime production in the plant also includes superchargers for the automotive and tractor industries.

McCulloch revealed that he will remain as a member of the board of directors and will serve as consultant to the firm. The purchase of all of the stock of the McCulloch plant by Borg-Warner Corporation, producers of parts and equipment for the automotive, marine, aircraft, agricultural and industrial equipment manufacturers, was announced in June. Reason for the sale of his stock, McCulloch stated was to provide more time to develop a new helicopter. He announced today that he has made arrangements to utilize space temporarily in the supercharger plant for offices of his newly formed organization known as the McCulloch Aircraft Company.

The McCulloch supercharger is a rotary air blower built from the basic design of the Roots type supercharger which, when applied to an engine, forces a greater quantity of fuel and air mixture under positive pressure into the

THE non-stop operations of our fleet depend to a large degree upon the efficient performance of U.S. Navy Oilers, since the majority of fighting ships must be refueled at frequent intervals. Oilers must keep abreast of the fleet wherever it goes, and every measure is taken to assure unfailing power from their Diesel engines. The PREMAX Pressure Indicator is used to check compression and firing pressures—proper maintenance of which assures maximum engine performance.

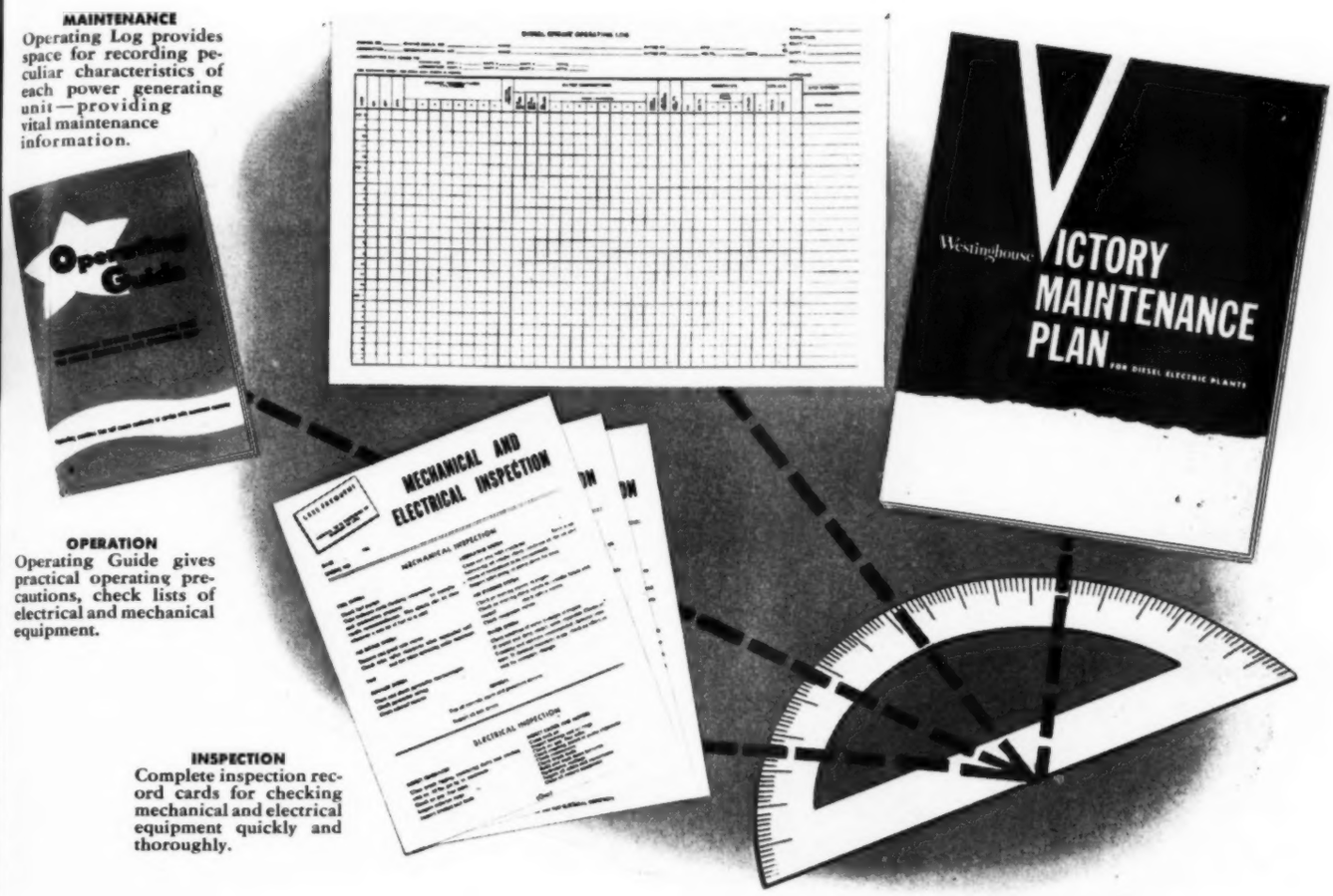
The rugged, sturdy PREMAX Indicator provides a way to observe these pressures that is unsurpassed in convenience, speed, and lasting accuracy. Requires no skill, scaling of diagrams, or calculations—maximum cylinder pressure is read instantly at any engine speed. The PREMAX has proved its universal applicability—first, by widespread use on Diesels operated in the power and transportation industries; and now by its use on Diesels in scores of fighting and auxiliary vessels of the U.S. Fleet.

BACK THE ATTACK—BUY WAR BONDS

Direct-Reading
PREMAX
ENGINE PRESSURE INDICATOR

BACHARACH
INDUSTRIAL INSTRUMENT CO.
7000 BENNETT STREET, PITTSBURGH, PA.
ONLY BACHARACH BUILDS A COMPLETE LINE OF ENGINE INDICATORS

MAINTENANCE
Operating Log provides space for recording peculiar characteristics of each power generating unit—providing vital maintenance information.



OPERATION
Operating Guide gives practical operating precautions, check lists of electrical and mechanical equipment.

INSPECTION
Complete inspection record cards for checking mechanical and electrical equipment quickly and thoroughly.

Covers every angle

OF WARTIME DIESEL ELECTRIC OPERATION

See that the right men in your plant get this vital information *NOW!*

This practical plan provides operating men with wartime operation and maintenance information they need to get maximum kwh from your Diesel Electric plant.

See that the right men in your organization get this material *at once.* Insist upon the systematic inspection and maintenance methods outlined in the plan.

The Westinghouse Victory Maintenance Program is endorsed by leading manufacturers of Diesel Engines. Contact your engine builder now to obtain copies of this complete, practical maintenance program. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

J-10256

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

. . . . *Continued from page 72* . . . .
engine, thereby increasing power output by as much as 40 per cent. An unsupercharged engine depends upon atmospheric pressure and piston suction for the purpose of introducing the mixture thus losing the advantage of the full potential power output of the engine.

The supercharger company was started by Robert McCulloch in 1936 as a result of his interest in automobile and marine racing. The company was incorporated in 1941. Employment has more than doubled in the last two years.

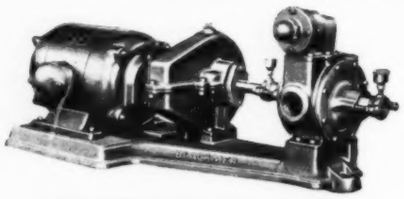
The new president of the supercharger plant is also president and general manager of the Pump Engineering Service Corporation, Cleveland, Ohio, which is a wholly owned subsidiary of Borg-Warner, manufacturers of aircraft pumps and accessories. Previous to his affiliation with Pesco in July, 1941, Minshall was vice-president in charge of engineering for Boeing Aircaft Company, Seattle.

While with Boeing he helped design the first flying boat used in international mail service, he supervised the engineering of one of the first planes to feature low-wing cantilever construction and retractable landing gear and he directed the development of the original flying fortress. Minshall was awarded the Wright Brothers medal for his contributions to aeronautics and in 1940 the government of New Zealand gave him the Musick Memorial Trophy in recognition of his efforts in behalf of the safety of air travel with special reference to ocean navigation.

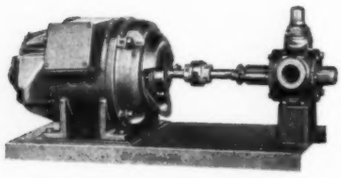
The new assistant general manager, James Stewart, terminates 15 years of activity with the Elliott Company, Jeannette, Pa., where he was assistant director of research. He is a graduate of Cornell University and holds membership in a number of engineering societies.

"A DIESEL INSTALLATION— IS NO BETTER THAN IT'S PUMPS"

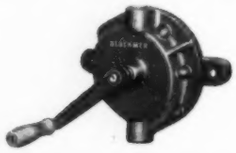
These **BLACKMER ROTARIES** *have a* **40 YEAR RECORD** *for* **DEPENDABILITY**



REDUCTION GEARED PUMPS
20 to 750 GPM—Pressures to 300 psi



DIRECT CONNECTED PUMPS
5-10-20 GPM—Pressures to 100 psi.



ROTARY HAND PUMPS
7 to 25 GPM—54 models.

Used for fuel and lube oil service on diesel installations — marine — stationary — transport.

Blackmer Nationwide Pump Engineering Service is at your call on all problems involving rotary pump applications.

YOU CAN BE SURE IF YOU SPECIFY "BUCKET DESIGN" BLACKMER PUMPS — SELF-ADJUSTING FOR WEAR

Your "pump file" is not complete without this 24 page book.

MAIL THE COUPON NOW

BLACKMER PUMP COMPANY
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Send the literature checked.

☐ 24 page General Catalog #130 (Illustrated at left)
☐ Bulletin No. 301—Facts about Rotary Pumps
☐ Bulletin No. 120—Marine Pumps

Signed .....

Company .....

Address .....

.....

Caterpillar Reallocates War Work for Greater Production of Diesel Tractors

SUBSTANTIALLY increased production of "Caterpillar" Diesel tractors for military purposes will be achieved in the near future, it is revealed by Louis B. Neumiller, president of Caterpillar Tractor Co.

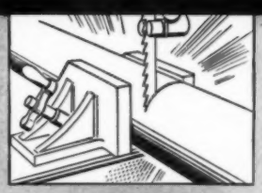
Some of the work will be done in the Victory Ordnance plant at Decatur, Illinois, operated by the "Caterpillar" subsidiary, Caterpillar Military Engine Company, and much of the manufacturing and the final assembly will be handled in the Berwick, Pennsylvania, plant of the American Car and Foundry Co.

Certain important parts of the additional tractor production will be manufactured in the Peoria and San Leandro, California, "Caterpillar" plants. To permit this increased production in the Peoria plant which is already working to capacity, this plant will be relieved of requirements to produce certain other items of war materiel that are now being manufactured.

C. O. Wold, vice president of "Caterpillar" will be in charge of the entire program. Charles Woodley, factory manager of the tractor plant, has been detached from that service to become co-ordinator of the tractor production activities at Decatur and Berwick. During Mr. Woodley's assignment to this work, Assistant Factory Manager William Naumann will be acting factory manager.

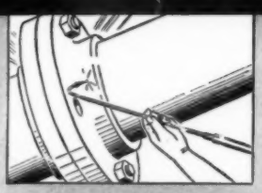
USE WALSEAL FLANGES, FITTINGS AND VALVES!

. . . THE MODERN METHOD OF JOINING COPPER OR BRASS PIPE AND TUBING

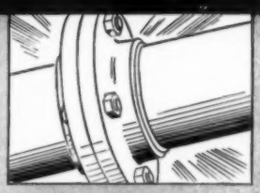


Cut pipe or tubing square, making certain that the pipe is not squeezed out of round or made undersize.

After cleaning flange and pipe carefully, apply flux to the flange recess and to the pipe or tubing.



Expand pipe by heating with the oxyacetylene flame. Next heat section of flange hub; then heat both pipe and flange hub section with wiping motion of torch.



Repeat process on adjacent flange hub and pipe sections. The joint is completed when a fillet of silver brazing alloy shows entirely around pipe at edge of hub.

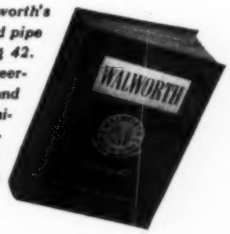
You can save installation time and assure strong, permanent assemblies by using Walseal flanges, fittings and valves. As illustrated in the sketches above, four simple steps connect a flange to the pipe with a silver brazed joint that is tight, leak-proof, and has a corrosion resistance equal to that of the pipe or tubing itself.

Walseal flanges are completely machined, faced, and drilled before brazing so that the assembly is ready to go into the line immediately after brazing. No refacing is required after heating because the relatively low brazing temperatures do not cause any warpage of the flange faces.

Joints made with Walseal flanges, fittings, and valves are not solder joints, but are Silbraz joints. That means that they cannot creep or pull apart under any temperatures to which the pipe or tubing can be safely subjected.

For more complete information on how to install Walseal flanges, fittings, and valves, write for Booklet 84. Address: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

You'll find pertinent information on Walworth's complete line of valves, fittings, pipe, and pipe wrenches in the new Walworth Catalog 42. Included are 78 pages of practical engineering data that simplify valve selection and make piping layouts easier. Write, on business stationery, for your free copy. Address: Walworth Company, 60 East 42nd St., New York 17, N. Y. Department 014



BOSTON WORKS
KEWANEE WORKS

WALWORTH
valves AND fittings

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

Lawrence B. Jackson Appointed Director of Engineering, Diesel Division, American Locomotive Company

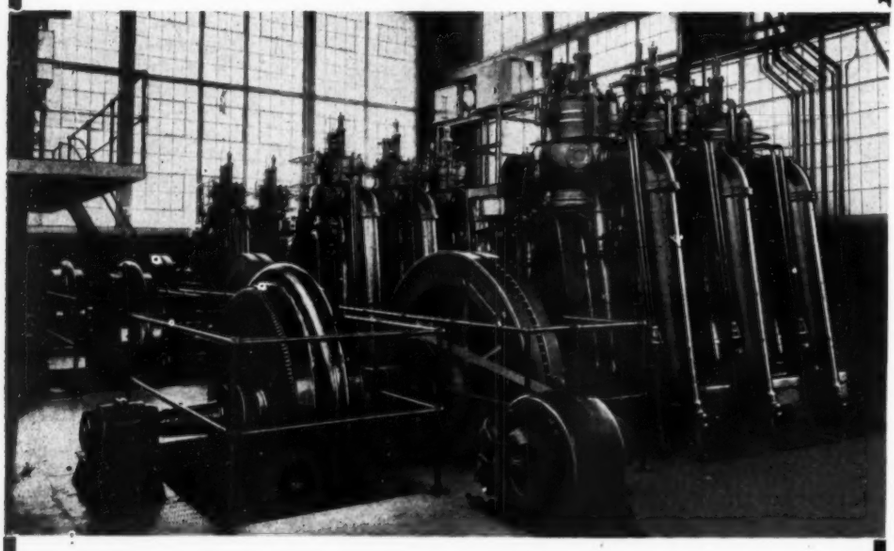
DUNCAN W. FRASER, President of the American Locomotive Company, announces the appointment of Lawrence B. Jackson as Director of Engineering, Diesel Division, effective October 1st.

Mr. Jackson is a graduate of Stevens Institute of Technology, and after association with the American Hawaiian S. S. Company as Superintending Engineer and with the Texas S. S. Company as Plant Engineer at the Bath, Maine, shipyard and Superintendent of Technical Division, Marine Department, he became associated with Fairbanks, Morse and Company in 1925. In this organization he advanced through the ranks from the position of Engineer, Marine Applications to the assignments of Assistant Chief Engineer and Chief Engineer of the Diesel Division, Manager, Marine Diesel Sales, in Chicago and Manager, New England (Sales) Branch at Boston, to the position of Manager of Engineering in 1936.

Mr. Jackson has contributed to various technical journals on subjects relating to internal combustion engines, and is the inventor of an Interlock Hydraulic Control for Water Gas Manufacturing and an Exhaust Silencer.

He is a member of the American Society of Mechanical Engineers, serving on the Power Code Test Committee, the Society of Automotive Engineers, Society of Naval Architects and Marine Engineers and is a member of the Technical Committee of the American Bureau of Shipping.

LARGE DIESEL POWER UNITS
Available for Immediate Shipment!



ONE 800 K.V.A. WESTINGHOUSE-NORDBERG DIESEL GENERATING UNIT

1—800 K.V.A. 640 K.W., .8 P.F. 3 phase, 60 cycle, 4160/2300 Volt 180 R.P.M. alternating current generator (recently rewound) with Vee belt driven exciter, directly connected to:

1—Nordberg 3 cylinder Air Injection Type EG forced scavenging type diesel engine, 180 R.P.M. (illustrated). Thoroughly overhauled since being removed from service. This fine fuel oil burning Diesel generator unit now available for immediate shipment from stock. *Engine can be furnished without generator for mechanical drive purposes.*

FOUR 350 H.P.—300 R.P.M. DIESEL UNITS

4—Modern design solid injection M.A.N. type diesel engines now being thoroughly rebuilt in our Los Angeles plant. Will be available for immediate shipment on short notice as mechanical drive units . . . or can be furnished with either 250 Volt D.C. or A.C. generators of either 50 or 60 cycle.

Several other Diesel Engines are available from stock.

Send us your inquiries today on these outstanding Diesel power units.

BEESON BROS. ENGINEERING CO.

1406 North Spring St., Los Angeles 12, California

Ralph Penn Appointed Director of Engineering

ALBERT PENN, President of Penn Electric Switch Co., recently announced that Ralph Penn has been appointed Director of Engineering in addition to his duties as Treasurer of the company.

Ralph Penn, treasurer and director of engineering, Penn Electric Switch Co.

Since the founding of the company, 25 years ago, Ralph Penn has devoted much of his time to the engineering and development phases of the business. For the past two years, he was directly in charge of the company's special development department in St. Louis, Missouri. Recently, this department was moved to Goshen, Indiana and consolidated with the Research Laboratory at the home plant. Burton Shaw, Research Chief of Penn Electric Switch Co., will continue to function as he has in the past.

DIESEL ENGINES DESCRIBED

162 engines described and illustrated

$5.00

NOW READY
TO MAIL
NEW - BIGGER - BETTER

Alco Four Cycle Stationary
Alco Universal Type
Alco-Sulzer "T" and "TM"
Atlas Imperial
Atlas-Lanova
Buckeye Diesels
Buda-Lanova Diesels
Busch-Sulzer Bros. 2-cycle
Busch-Sulzer Bros. 4-cycle
Caterpillar Industrial Engines
Caterpillar Marine Engines
Chicago Pneumatic Model 8-CP, and 9-CP
Chicago Pneumatic Type 16-CP
Chicago Pneumatic Type RHB-50
Clark Bros. Diesels
Consolidated Diesel Electric Power Units
Cooper-Bessemer Type JS
Cooper-Bessemer Type EN & GN
Cooper-Bessemer Type LS Marine
Cummins Diesels
De La Vergne Series 10
De La Vergne Model VG
De La Vergne Model VM
De La Vergne Gas Engines
De La Vergne Model VO
Dodge-Lanova Diesels
Enterprise Diesels
Fairbanks-Morse 33 and 37
Fairbanks-Morse 36
Fairbanks-Morse 42
Fairbanks-Morse 32 and 35
Fairbanks-Morse Model 38
Fairbanks-Morse Model 46
Fulton Diesels
General Motors Model 71
General Motors Model 567
Gray Marine Diesels
Guiberson Radial Diesels
Hamilton Engines
Hercules Diesels
Hill Diesels
Ingersoll Rand Type "S"
International Harvester
Kahlenberg Engines
Kermath 4-cycle
Lathrop Types D50 and D80
Lister-Blackstone Diesels
Lorimer Diesels
Mack-Lanova Diesels
Murphy Diesels
Nordberg 4-cycle Diesels
Nordberg 2-cycle Diesels
Nordberg Gas-Diesels
Palmer Bros. Diesels
Rathbun-Jones Diesels
Rathbun-Jones Gas Engines
John Reiner Marine Units
Sheppard Diesels
Superior Model "A"
Superior Model "D"
Superior Type M
Superior Type S
Union Diesels
U. S. Diesel Plants
Venn-Severin Models HC and M
Washington Iron Works Diesels
Waukesha-Hesselman Type
Witte Types
Wolverine Diesels
Worthington Diesels
Worthington Gas Engines

DIESEL

DIESEL ENGINES, INC.—Two West Forty-Fifth Street—New York 19, N.Y.

Enter my order for a copy of the New Diesel Engine Catalog, Volume Eight, Edited by Rex W. Wadman, for which I enclose $5.00.

NAME:

ADDRESS:

Please print name and address

Sorry, we cannot imprint names on this year's edition of the Diesel Engine Catalog

Standard of Indiana Announces a New Detergent Type Lube

DEVELOPMENT of a new detergent type lubricating oil which will reduce wear and assure engine cleanness and oil stability for low speed Diesel engines is announced by Standard Oil Company of Indiana.

Many engines give clean operation with conventional oils, but where dirty operation cannot be corrected by mechanical adjustment, the new detergent type lubricating oil can be used, according to Standard Oil engineers. The new oil will thus prevent ring-sticking, piston scuffing and excessive sludge and gum deposits. The detergency results from the use of an additive which is both a detergent and an oxidation inhibitor.

When a lubricant without detergency is used, carbon and other products of oxidation, as well as dirt, stick to each other and to engine parts. They deposit in rings and on valves and clog filters. With the new detergent type lubricating oil for low speed Diesels, however, a film coats the carbon and dirt, prevents particles from sticking and holds them in suspension until they are trapped by a filter or drained from the engine, according to Standard Oil engineers.

TOMORROW THEY WILL FLY!

Today Bill and Jane and Mother look to the skyways! Dad may already ride the airlines. Perhaps he holds his pilot's certificate, too. But tomorrow they all will fly. *Family* flying must be *safe* flying and *safe* flying must be *fire-safe*. That's why the Guiberson air-cooled radial diesel engine, using fuel that will not burn even when exposed to flame, is the power plant for the family plane of tomorrow. Guiberson powered equipment is now hitting the Axis in distant corners of the world. It is ready today to serve American industry with fire-safe power on land, on sea and in the air!

AMERICA'S RADIAL AIR-COOLED DIESEL ENGINE

- No Fire Hazard
- Lower Fuel Consumption
- Increased Cruising Range
- Greater Stamina
- Dependable Operation
- Instant Response to the Throttle
- No Ignition System
- Lower Cost of Fuel
- Constant Torque at All Speeds
- No Radio Interference

GUIBERSON — BUILT BY MEN WHO KNOW DIESELS

ESTABLISHED 1919

Guiberson U.S.A.

THE GUIBERSON DIESEL ENGINE COMPANY
THE GUIBERSON CORPORATION
Aircraft and Heater Division
DALLAS, TEXAS — CHICAGO, ILLINOIS

Penn Appoints J. B. Bowen Atlanta Manager

JUDSON P. BOWEN, a native of Georgia, was recently employed by Penn Electric Switch Co., Goshen, Ind., as manager of the company's Atlanta branch located at 36 Fifth St., N. W. He succeeds N. E. Jennison, former manager, who has been transferred to the factory in Goshen, Ind., to assume new duties in the company's research laboratory.

Mr. Bowen has had wide experience in the industry having formerly been with American Radiator, American Blower Co., Georgia Power Co., Kelvinator, Westinghouse, and Larkin Coil Co.

Buda Appoints Guerasimoff Chief Engineer of Engine Division

MR. N. GUERASIMOFF, formerly assistant chief engineer, has been appointed by H. G. Smith, executive engineer, to position of chief engineer of the Engine Division of the Buda Company, Harvey, Ill.

N. Guerasimoff

Mr. Guerasimoff has been with the Buda Company for the past nine years during which time he has served as mathematician, engineer on stress analysis, and design engineer on gasoline and Diesel engines. From 1939 to 1940, he was in charge of the development and testing of Diesel engines. In August 1941, he was appointed assistant chief engineer in charge of the Radial Diesel Engine Division.

Mr. Guerasimoff served in World War I as a Russian officer in charge of a machine gun company and was with the Russian expeditionary forces in Macedonia. After coming to this country, he graduated from Stevens Institute of Technology with a degree in Mechanical Engineering. From 1929 to 1930, he was with the Oil Gear Company of Milwaukee as design engineer on hydraulic presses and broaches. From 1930 to 1934, he was assistant chief engineer with the Tornado Motor Corporation of Long Island City, N. Y. Since 1934 he has been with the Buda Company.

Willard Names New Credit Manager

Harry J. Ehlert

WILLARD Storage Battery Company, Cleveland, Ohio, announces the appointment of Harry J. Ehlert as credit manager. Mr. Ehlert, formerly assistant credit manager, has been with the Willard Company for 20 years. He succeeds Harley A. Gardner, who was recently elected assistant treasurer, following the retirement of Harry H. English.

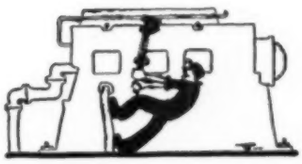
New Westeo Industrial Pump Catalog

A NEW 60-page bulletin covering the extensive line of Westco turbine type pumps is now being distributed. Profusely illustrated in two colors this comprehensive booklet covers general information, design details, principle of operation, operating characteristics, detailed descriptions of a wide variety of pump types and drive arrangements and a section devoted to engineering data. A copy of this informative and useful Catalog No. 43 will be mailed free upon written request to Joshua Hendy Iron Works, Pomona Pump Co. Division, 206 East Commercial St., Pomona, California.

Bardco Opens Washington, D. C. Offices

BARDCO Manufacturing & Sales Co. recently announced the opening of new offices in Washington, D. C., under the supervision of James G. Goodwillie, Sales Engineer. The address of this new Bardco office will be 606 Barr Bldg.

Bardco manufactures generating sets for continuous duty and emergency service, powered with Diesel, gasoline or natural gas engines in stationary and portable types, arranged for semi and full automatic operation.



Young

HEAVY DUTY RADIATORS

Triumph Over World's Toughest Service Conditions

Through trackless desert wastes and blinding standstorms, the huge buses and freight units of the Nairn Transport Company have maintained regular schedules for the past ten years over thousands of miles of the world's toughest going. These Diesel powered cruisers, built by Marmon-Herrington, are equipped with YOUNG Heavy-Duty radiators . . . original equipment that is still in service combating the desert's searing daytime heat and windswept chill of night. Such unfailing service is typical of YOUNG Heat Transfer Equipment . . . designed and built by engineers with a quarter-century of heat transfer experience. YOUNG units are noted for rugged performance and maximum cooling efficiency. Whatever your heat transfer problem may be, YOUNG products include a unit to handle it . . . equipment for heating and ventilating, cooling units for gas, gasoline and diesel engines, and aviation equipment that is in active service with Allied combat planes over a score of fighting fronts. Write for engineering details.

Young Radiator Company
Dept. 233-K Racine, Wis., U. S. A.

Buy Bonds, Produce More, Salvage Scrap, Win the War.

Young
HEAT TRANSFER PRODUCTS
OIL COOLERS - GAS, GASOLINE, DIESEL ENGINE COOLING RADIATORS - INTERCOOLERS - HEAT EXCHANGERS - ENGINE JACKET WATER COOLERS - UNIT HEATERS - CONVECTORS - CONDENSORS - EVAPORATORS - AIR CONDITIONING UNITS - HEATING COILS - COOLING COILS
Young SERVICE

AS YOU NEVER DROVE BEFORE!

Many a soldier owes his life to a commander who drove him to the utmost in battle—*never let him slacken for a single fatal instant!* And after the war, many a worker will owe his economic safety to a leader who drove him continuously for higher Pay-Roll allotments for the purchase of War Bonds!

Despite higher taxes and prices, the average worker still has more money than ever before—particularly on the basis of the *family* income. With others in the family earning, too, just let the worker 'figure it out for himself', and he usually will realize that *now* he can put more into War Bonds than he has been doing.

That's why the Treasury Department has set new quotas for the current Pay-Roll Allotment Drive—*quotas running about 50% above former figures.* These quotas are designed to reach the *new* money that's coming into the family income. Coming from millions of new workers . . . from women who never worked before . . . from millions who never before earned anything like what they are getting today!

The current War Bond effort is built around the *family* unit, and the Treasury Department now urges you to organize your War Bond *thinking*—and your War Bond *selling*—on the basis of your employees' *family* incomes. For details, get in touch with your local War Finance Committee which will supply you with all necessary material for the proper presentation of the new plan to your workers through your labor-management committees.

Today about 30,000,000 wage earners, in 175,000 plants, are buying War Bonds at the rate of nearly half a billion dollars a month. Great as this sum is, *it is not enough!* So turn-to today! Get this new *family income plan working!*

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

YOU'VE DONE YOUR BIT—NOW DO YOUR BEST

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

This Space Is a Contribution to America's All-Out War Effort By

Editor—DIESEL PROGRESS

STAR "POWERS" THIS MODERN SUBMARINE
for antennae mast hoist
for two periscopes—each a motor, a hoist and a brake
for bow plane tilting
for bow plane rigging, anchor windlass and bow capstan
for hydraulic steering gear
for low pressure ballast unloader
for stern plane tilting
In the tight spots it's a STAR

There are many "tight spots" on the modern submarine. In your product, there may be just one. But in that "tight spot," a Star Electric Motor will do its part—and do it well. To begin with, it will "fit" the spot. It will do so thanks to Star's unique welding process, which adapts various H.P. requirements to various shapes and sizes — and does this without special molds, without special castings. And it will "fit" the job—for the same Star engineers, who provide "packaged power" to control the periscopes and steering gears of the machines of war, also provide "packaged power"—*tailored to fit*—for the products of peace.

Star Electric Motor Co., Bloomfield, N. J.

FOR 33 YEARS, Star Motors have provided a complete line of standard as well as specialized motors—in sizes from ½ to 200 H.P. Today they are providing dependable power for many applications. Please write us about your requirements today.

POWER PACKAGED AS YOU NEED IT

STAR MOTORS

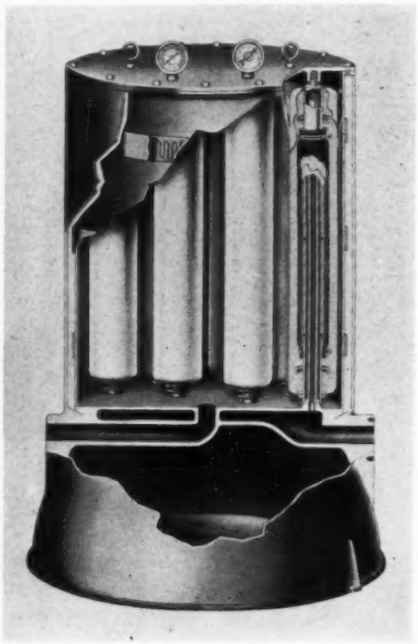
. . . . *Continued from page 54* . . . .

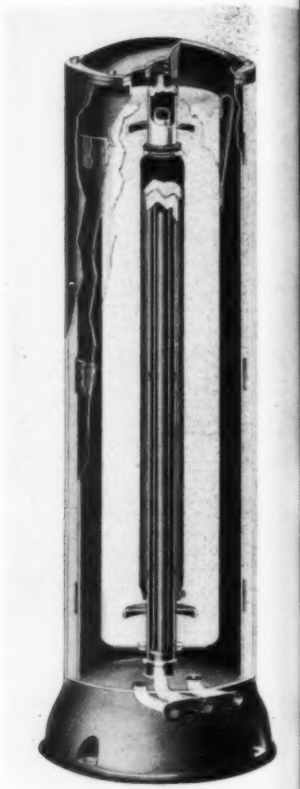
Frequent analysis of lubricants should be made, and cooling equipment inspected oftener, since all these factors have a direct bearing on plant maintenance. Keep your plants and the equipment in them clean and free from any refuse or material which may clutter up and impede the progress of the maintenance crews in carrying on their work of repairs. Keep your repair and replacement parts in an orderly condition so that the maintenance crews will have things at hand once they start the job. Time is a vital factor in such work, especially in plants that have but a minimum of outage for such repairs.

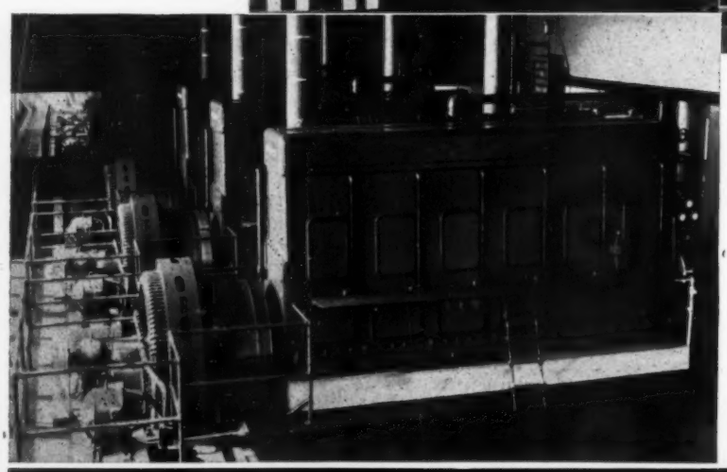
New Line of Honan-Crane Fuel Oil Purifiers

HONAN-CRANE Corporation has announced a line of fuel oil purifiers designed to handle refined or crude Diesel fuels effectively at a high rate of flow. Available in single or multiple units, depending upon the rate of flow required, these purifiers are arranged for direct connection to the engine, have no moving parts and employ Cranite, a specially prepared Fullers earth, as the purifying medium. These new purifiers may be had with or without heater bands and insulation and its operation is fully automatic. Write Honan-Crane Corporation, Lebanon, Indiana for Bulletin No. 65.

Illustrations show Honan-Crane single and multiple unit purifiers.







3 BUCKEYE Diesels

AT WARROAD, MINNESOTA

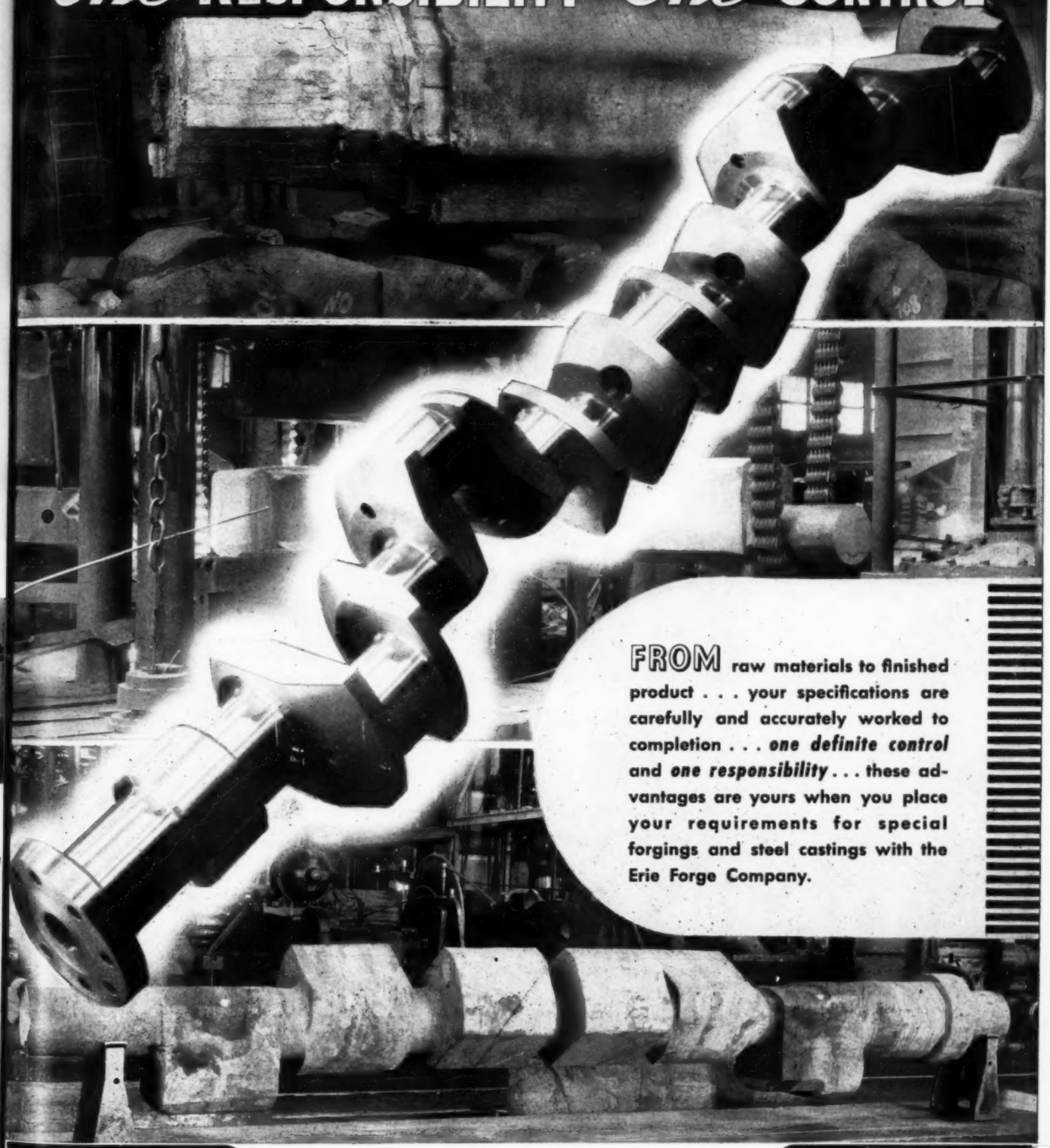
The Border Counties Power Cooperative now has electrical energy to serve the isolated farm homes in three Counties along the Canadian Border in Northern Minnesota. Three Buckeye Diesels of 504 hp. each have brought urban comforts and conveniences to the aggressive farm families who work this lonely stretch of land — unfailing, economical power is now theirs. Buckeye will be ready to equip many more such communities when the Victory is won.

ENGINE BUILDERS SINCE 1908

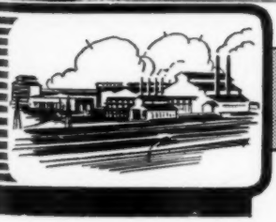
Be Profitwise and Dieselize with Buckeyes

THE BUCKEYE MACHINE COMPANY ..... LIMA, OHIO

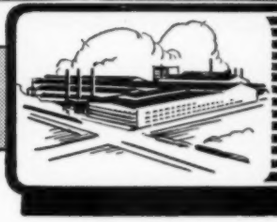
One RESPONSIBILITY··· *One* CONTROL



FROM raw materials to finished product . . . your specifications are carefully and accurately worked to completion . . . ***one definite control*** and ***one responsibility*** . . . these advantages are yours when you place your requirements for special forgings and steel castings with the Erie Forge Company.



ERIE FORGE COMPANY, ERIE, PA.



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West Coast Diesel News

By JIM MEDFORD

THE Lynch Shipbuilding Company, San Diego, California, have been appointed distributors and agents for Diesel engines manufactured by the Enterprise Engine and Foundry Company of San Francisco.

TWO 6 cylinder, 80 hp. Caterpillar Diesels have been installed as auxiliary power in the new Lynch-built (San Diego, California) 166-ft. steam rescue tug for the Navy. They will operate the 6-inch salvage pumps.

LAUNCHED by the Victory Shipbuilding Corporation, Newport, Oregon, the 66-foot Navy harbor tug *YT 306* is powered with twin Buda Diesels with Morse chain drive, Westinghouse air compressor and Ingersoll-Rand pumps.

DESIGNED for harbor service, the new 50-foot tug by Marine Construction Co., San Diego, California, for Star and Crescent Boat Co., will be powered with a 125 hp., 6 cylinder Cummins Diesel with Twin Disc gears.

WASHINGTON Diesels of six cylinders and 375 hp. at 325 rpm. are main power in the three Navy YT tugs completed by the Puget Sound Bridge and Dredging Co., Seattle, Washington. They are 83 feet long.

BROUGHT out from the east coast by the Canadian Fishing Company, Vancouver, B. C., one of the fleet of several Gloucester-type fishermen is being repowered with a 240 hp. Fairbanks-Morse Diesel.

AN unusual order placed by the Canadian Fishing Co., Vancouver, B. C., is for two seine boats of the west coast type to be built by a St. Johns, Newfoundland, yard and powered with Caterpillar Diesels.

KRUSE and Banks, North Bend, Oregon, have the contract for construction of the Army's new type tugs of 72 feet and powered with a Fairbanks-Morse 350 hp. Diesel.

SANTA ROSALIE, 80-foot tunaman of San Pedro, California, has had installed a new Fairbanks-Morse 30 hp. Diesel for refrigeration service. The compressor can also be run from the main 200 hp. Enterprise Diesel if needed.

ANOTHER Southern California fishing fleet unit to get a new Fairbanks-Morse Diesel is the *Liberty Bell* by the Lynch yard at San Diego, California. This time it is a main engine of 6 cylinders and 240 hp. with sailing clutch.

FISHER Brothers, Caterpillar distributors at Astoria, Oregon, report installation of six marine Diesels in the Astoria fishing fleet including George Moskovito's *Elector* and Charles Wuori's *Stampede II*. These are 6 cyl., 100 hp. units.

ANOTHER Astoria, Oregon, craft to be repowered with a Caterpillar marine Diesel is the tug *Umpqua Chief*, owner Lloyd Knapps, with a V-8, 135 hp. at 900 rpm. engine.

REPLACING a heavy duty gasoline engine, a Mack Marine Diesel of 100 hp. has been installed in the 68-foot O. B. Hardy tug *Port Edward*, Vancouver, B. C. She makes 8 knots towing two loaded 100-ton fish barges.

AT the George Riley yards, Los Angeles, California, the 50-foot seiner *Mabel* for L. H.

Where Engine Failure is Fatal

On the ships of the U. S. Navy, Coast Guard, and Merchant Marine, the engines that power them are as vital as the guns. On ships of war, engine failure is fatal.

That is why care is used in the selection of the oil filters, because properly filtered oil means more dependable engine operation, less maintenance and repairs, lower consumption of valuable lubricating oil. The Filters used must perform reliably and be easily serviced.

That so many thousands of MICHIANA Oil Filters have been installed for this service—to filter and clean the oil, is a tribute to the efficiency which has been so well demonstrated for many years on land and sea—on internal combustion engines of all types and capacities. MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.

No. 17050 (163HP) Filter with single Element. This standard Element is employed in groups for filters up to 3266HP. When making Element replacements, you can be assured best results by using genuine MICHIANA Elements.

MICHIANA OIL FILTERS

Brown will be powered with a Caterpillar marine Diesel of 70 hp., having 2 to 1 Twin Disc gears.

THE Shepherd Tractor and Equipment Co., Los Angeles, California, report sales of seven Caterpillar marine Diesels to members of the Santa Barbara fishing fleet including three to members of the Castagnola group.

B. C. PACKERS, Ltd., Vancouver, B. C., have added another Caterpillar Diesel engined boat to their extensive fleet by repowering their fish tender with a 70 hp. engine at the Celtic yards, New Westminster, B. C.

THE growing popularity of the Diesel engine in oil field service is again emphasized by Shepherd, Los Angeles distributor, by sale of a V-8, 135 hp. Caterpillar Diesel to the Bender Drilling Co., for wild catting slush pump operation.

TWIN Murphy Diesels of 100 hp. have been installed in the Nootka Packing Co.'s 72 foot seiner at the Fraser River yard, New Westminster, B. C They will have magnetic clutches and vessel will serve as a tender.

WESTERN GIRL, the new $60,000 pilchard seiner of Nelson Brothers Fisheries, New Westminster, B. C., has a 240 hp. Washington Diesel installed by builders, Star Shipyards, also of New Westminster.

Fairbanks Morse "OP" Diesels and Builders of Them Praised

THE telegram reproduced below tells a first-hand story of the successful encounter of one of our F-M opposed piston Diesel engined PC boats with an enemy submarine. A splendid tribute to the people of Fairbanks, Morse & Co.

WESTERN UNION

WASH DC GOVT WASHINGTON DC SEPT 16 1943 1109A

TO THE MEN AND WOMEN OF FAIRBANKS MORSE AND CO

MAIN ENGINES NOS 832229 AND 832230 MANUFACTURED BY YOU AND IN SERVICE ABOARD THE USS PC-565 FIGURED IN THE RECENT SINKING OF A GERMAN SUBMARINE BY THIS PATROL-CHASER. WHILE GUARDING A VITAL CONVOY CONTACT WAS MADE WITH THE UNDERSEAS RAIDER AND YOUR DIESELS SPEEDED THE PC TOWARDS THE TARGET. FOUR MINUTES LATER THE U-BOAT WAS DEPTH-CHARGED TO THE SURFACE AS THE CHASER WHEELED FOR A SECOND ATTACK. THE 565 BORE DOWN ON THE SUBMARINE AT HIGH SPEED TRYING TO RAM. ONE-HUNDRED YARDS AWAY THE SUB SUDDENLY SANK WITH HER HATCHES WIDE OPEN AND ONE MAN SWAM FREE. SOLE SURVIVOR OF THE ATTACK WAS THE SUBS COMMANDING OFFICER WHO WAS PICKED UP BY THE 565. THE RELIABILITY OF YOUR ENGINES IN MEETING EVERY TEST THROUGHOUT SOME 50,000 MILES OF DEEP WATER DUTY SHOULD BE A SOURCE OF PRIDE TO YOU WHO MADE THEM

E S COCHRANE REAR ADMIRAL USN CHIEF OF THE BUREAU OF SHIPS

1130A

832229 832230 USS PC-565 565 565 50,000..

Latest Diesel Patents

A description of the outstanding patented inventions on Diesel and Diesel accessories as they are granted by the United States Patent Office. This information will be found a handy reference for inventors, engineers, designers and production men in establishing the dates of record, as well as describing the important Diesel inventions.

Conducted by C. CALVERT HINES

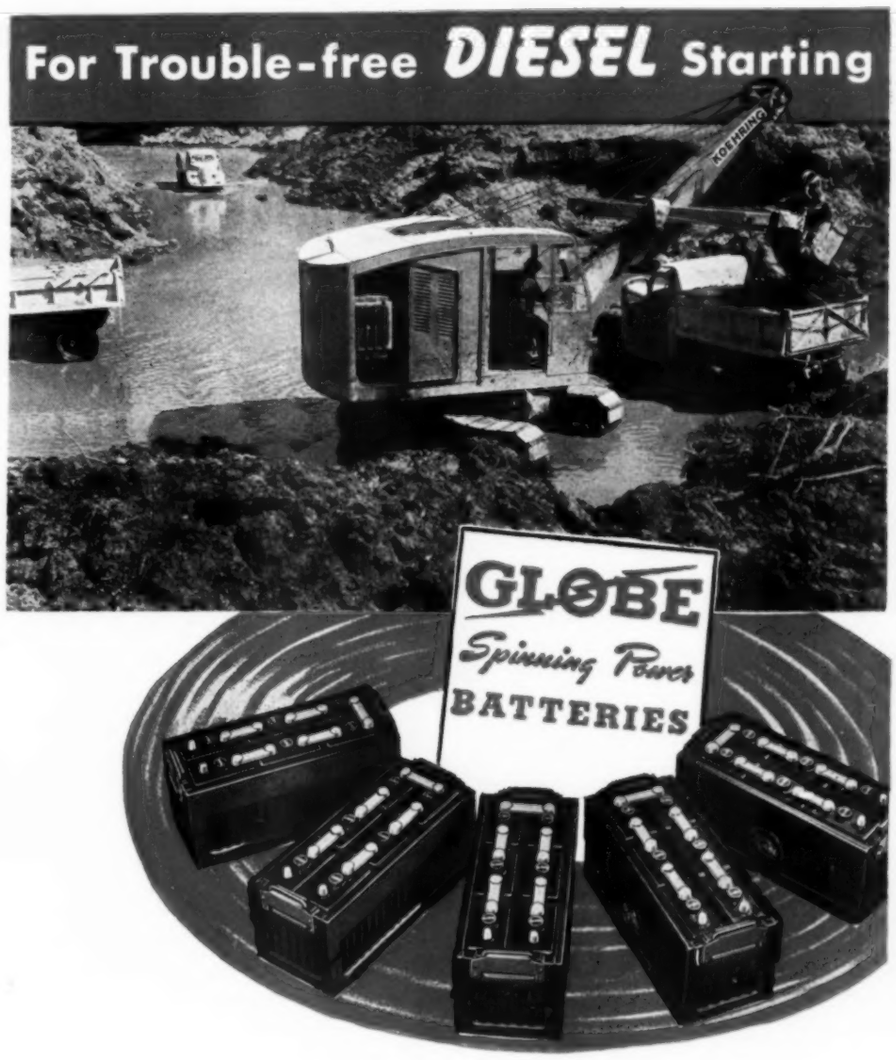
2,316,011
FUELS FOR INTERNAL COMBUSTION ENGINES

Pharis Miller and Gould H. Cloud, Elizabeth, N. J., assignors to Standard Oil Development Company, a corporation of Delaware
No Drawing. Application October 28, 1939. Serial No. 301,779
10 Claims. (Cl. 44—57)

7. A compression-ignition engine fuel comprising a hydrocarbon oil boiling above the gasoline range and 0.2 to 3% of a thiazole.

2,316,012
MOTOR FUEL

Pharis Miller, Elizabeth, N. J., assignor to Standard Oil Development Company, a corporation of Delaware
No Drawing. Application December 28, 1939.



Globe Battery equipment is an *extra* safeguard of *trouble-free* Diesel performance. The efficiency, low operating cost, and dependability which you associate with Diesel performance are characteristics of GLOBE Spinning Power Batteries in Diesel-starting service. If you are looking ahead, call in a Globe engineer. No obligation. Address nearest factory.

GLOBE-UNION INC. • *Milwaukee 1, Wisconsin*

Atlanta • Boston • Cincinnati • Dallas • Kansas City • Los Angeles
Memphis • Minneapolis • Philadelphia • Seattle

Modern Mariners rely on Quincy Compressors

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ENGINE GENERATOR SETS

5 KW. TO 100 KW.

Duplex Truck Co.
Lansing, Michigan

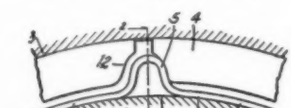
Serial No. 311,252
9 Claims (Cl. 44—77)

1. A motor fuel composition comprising mostly hydrocarbons adapted as a fuel for spark-ignition engines blended with a minor but effective octane improving amount of at least 1% by volume of a ketonic compound boiling in the boiling range of said fuel and having the formula:

$$R \cdot CO \cdot R^1 \cdot CO \cdot R^2$$

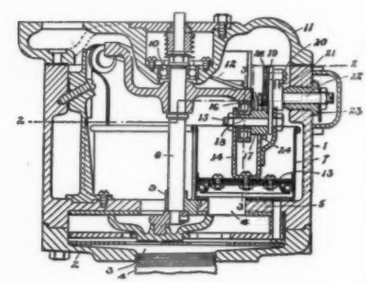
wherein R and R^2 are terminal organic groups, and R^1 represents an aliphatic hydrocarbon radical separating carbon atoms linked to oxygen, each oxygen atom being bound to only one carbon atom, said fuel composition being free of any substantial amount of other oxygen-containing organic compounds.

2,300,518
ANCHORED PISTON RING ASSEMBLY AND PISTON RING ANCHORING DEVICE
Harold P. Phillips, Hastings, Mich., assignor to Hastings Manufacturing Company, Hastings, Mich., a corporation of Michigan
Application March 8, 1940, Serial No. 322,898
9 Claims. (Cl. 309—47)



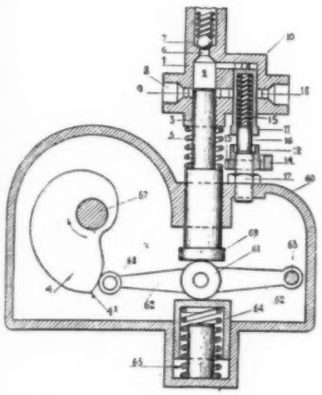
1. The combination with a piston provided with a piston ring groove and a split piston ring, of a stop member disposed in said groove out of radial thrust engagement with the ring and in circumferential restraining engagement with the split of the piston ring to prevent rotative movement thereof within the groove, said stop member comprising a strip of spring metal of a width approximating the width of the groove and having an intermediate loop-like bend constituting a ring engaging stop lug adapted to be disposed between the ends of the ring, the remaining portions of the stop member constituting base members and being curved to conform to the bottom of the groove and having longitudinal slits in the ends thereof and being spread at the slits providing springable groove wall engaging anchoring prongs.

2,316,399
MEANS FOR ADJUSTING THE LENGTH OF STROKE OF PISTONS
William H. D. Brouse, Toronto, Ontario, Canada, assignor to John Wood Manufacturing Company, Inc., Philadelphia, Pa.
Application November 26, 1941, Serial No. 420,574
6 Claims. (Cl. 74—600)



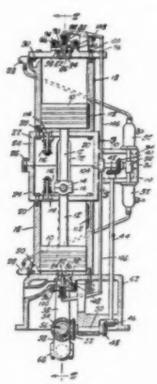
1. A mechanical movement for adjusting the length of stroke of a piston comprising in combination with the piston and piston pin, of means eccentrically mounted on the piston pin for limiting the travel of the piston, oscillatable means operatively connected with the piston, and means connected with said oscillatable means for rotating said eccentric means.

2,301,435
INJECTION PUMP
Jean Mercier, Paris, France
Application May 8, 1941, Serial No. 392,579
13 Claims. (Cl. 103—37)



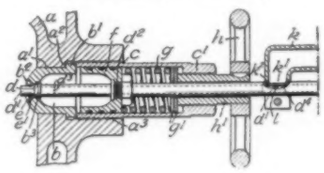
1. An injection pump which comprises, in combination, a pump barrel, liquid inlet means connected to said pump barrel, a piston movable in said pump barrel, a spring loaded discharge valve connected with said pump barrel, a cylinder in permanent communication with the portion of said pump barrel between said piston and said discharge valve, a piston slidable in said cylinder, so as to form, in said cylinder, a variable volume chamber communicating with said portion of the pump barrel, means for locking said second piston with respect to its cylinder so as to keep the volume of said chamber constant, during the injection and means for suddenly releasing said second piston to permit free increase of the volume of said chamber, whereby the pressure drops suddenly in said pump barrel and stops injection.

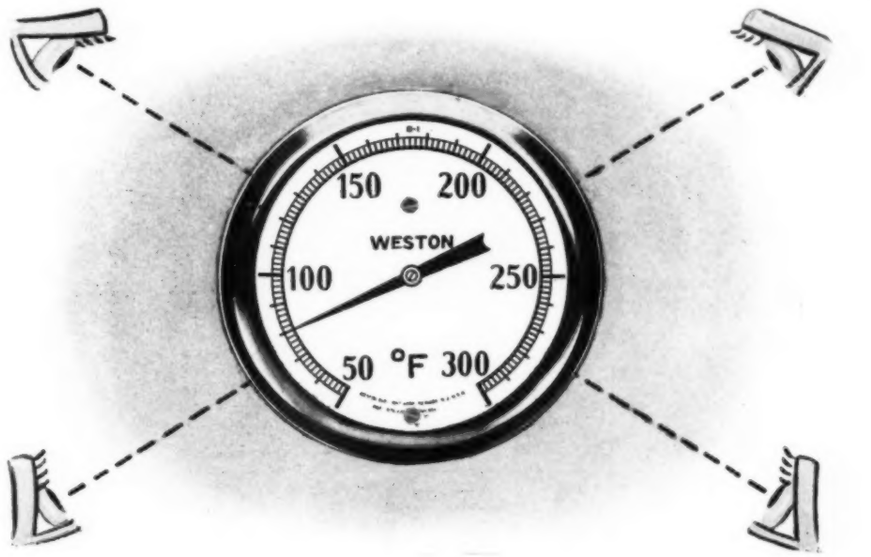
2,309,434
DIESEL ENGINE
Frank Arena, Elba, N. Y.
Application November 3, 1941, Serial No. 417,707
2 Claims. (Cl. 123—57)



1. A Diesel engine of the two-cycle type comprising opposed cylinders arranged in axial alignment, a casing guide fixedly connecting said cylinders one with the other, said casing guide being provided with slots, pistons slidable in said cylinders, a crosshead member extending through said slots and slidably guided thereby, said pistons being fixedly connected with said crosshead member, an air inlet valve communicating with said cylinders and with said casing guide, said cylinders being provided with air passages for delivering air compressed by the respective cylinders to their combustion chambers upon completion of the power strokes of the respective pistons, said casing guide comprising two sections detachably connected together, a gear case carried by said casing guide comprising two sections each secured to one section of the casing guide, a shaft rotatably journaled in said gear case, said cylinders being provided with precombustion chambers, fuel injection means for delivering fuel to the precombustion chambers, a cam on said shaft for actuating said fuel injection means, exhaust valves, means operatively connecting the exhaust valves with said shaft, a crank shaft, arms connecting said crosshead member with said crank shaft, and gear means operatively connecting said crank shaft with said first-mentioned shaft.

2,312,055
COMPRESSION IGNITION ENGINE
David Joseph Smith, Dartmouth, England, assignor of one-half to Donald Stuart Kennedy, Andover, Hampshire, England
Application April 7, 1942, Serial No. 438,038
In Great Britain February 19, 1941
9 Claims. (Cl. 123—23)





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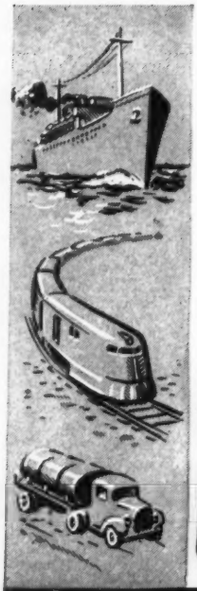

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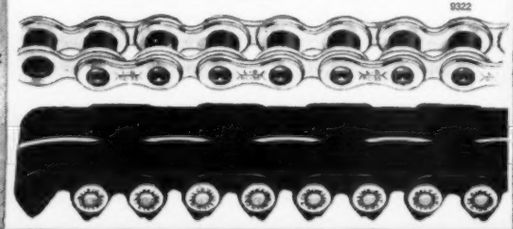

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SILENT AND ROLLER TYPES

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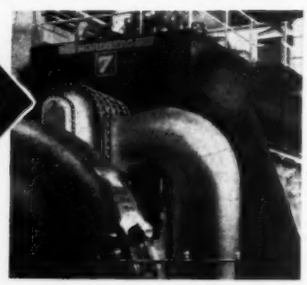
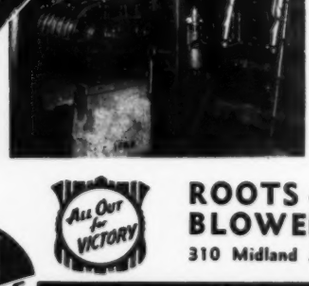


Roots-Connersville Scavenging Blower of 14,000 CFM capacity at 800 RPM; 2¾-lbs. pressure; installed on Diesel at Rockville Centre, N. Y. municipal generating plant.

Roots-Connersville Positive Displacement Blowers are ideally suited for supercharging and scavenging applications, due to their characteristics of positive air delivery regardless of pressure variation. They have helped improve Diesel performance on many of the country's outstanding modern Diesel installations, as well as in modernization of old installations.

Improvement in *OLD* Installation Performance



Power output of this 4-cylinder Diesel, installed in a large ice plant, was materially increased by the addition of an "R-C" Scavenging Blower.

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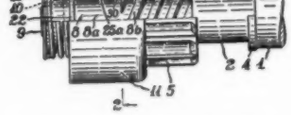
Roots CONNERSVILLE SINCE 1854 — *Supercharging and Scavenging* **BLOWERS**

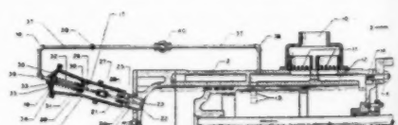
1. In a compression ignition engine having a main combustion chamber in which air is compressed by movement of a piston, the combination of an auxiliary combustion chamber in proximity to said main combustion chamber, a valve normally shutting off communication between said chambers, a plunger for feeding a charge of fuel in paste form to said auxiliary combustion chamber, said plunger being positioned to prevent back flow of said charge of fuel, and means for atomizing said charge of fuel in said auxiliary combustion chamber by compressed air from said main combustion chamber, said valve being opened by the increased pressure due to combustion of said atomized fuel in said auxiliary combustion chamber.

2,310,174
ENGINE STARTER DRIVE
Kenneth F. Douglas, Elmira, N. Y., assignor to Bendix Aviation Corporation, South Bend, Ind., a corporation of Delaware
Application December 6, 1941, Serial No. 421,947
4 Claims. (Cl. 74—7)



1. In an engine starter a power shaft, a pinion journalled thereon for longitudinal movement into and out of engagement with a member of an engine to be started, screw-threaded means for actuating the pinion from the shaft, and means for yieldably holding the pinion in idle position including an annular elastic member anchored to the pinion traversing means and having a portion frictionally connected to the shaft, said portion being movable out of such frictional connection by centrifugal force, and said annular member having provisions to positively limit the centrifugal movement of said portion.

2,301,503
FUEL ADMISSION DEVICE FOR INTERNAL COMBUSTION ENGINES
Jim Barton, Pioneer, Tex., assignor to Phillips Petroleum Company, a corporation of Delaware
Application April 24, 1939, Serial No. 269,777
3 Claims. (Cl. 123—92)



1. In apparatus for admitting fuel into an internal combustion engine having a cylinder and a piston arranged to reciprocate therein, the combination comprising a body member connected to the cylinder and including a control compartment and a fuel compartment, means for supplying fuel to the fuel compartment, a valve associated with the fuel compartment for controlling the flow of fuel into the cylinder, means for creating fluid pressure on each expansion stroke of the piston, and mechanical means in the control compartment responsive to the fluid pressure created on each expansion stroke of the piston, said last mentioned means including a diaphragm for positively actuating the valve to open the same and admit fuel into the cylinder.

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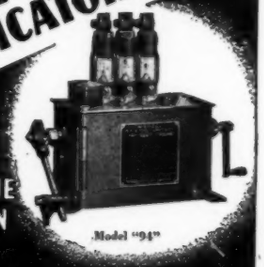
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2,304,242

DIESEL FUEL

Gould H. Cloud, Elizabeth, N. J., assignor to Standard Oil Development Company, a corporation of Delaware

No Drawing. Application March 22, 1939, Serial No. 263,407

6 Claims. (Cl. 44—9)

1. A compression-ignition engine fuel comprising a hydrocarbon oil boiling from 400° F. to 700° F. and as an ignition improver and stabilizing agent a minor amount of an essentially hydrocarbon unsymmetrically substituted hydrazine compound selected from the group consisting of dialkyl hydrazines, phenyl hydrazine, diaryl hydrazines, alkylaryl hydrazines, quinalyl hydrazine, acetyl phenyl hydrazine, 3-amino phthal hydrazine.

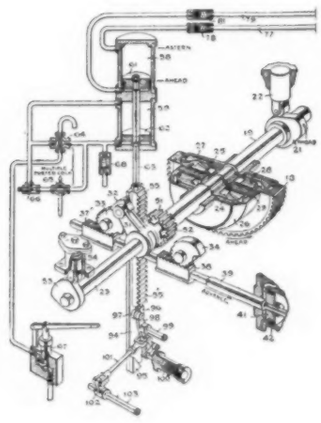
2,304,161

REVERSING AND LEAD CONTROLLING MECHANISM FOR FUEL INJECTION ENGINES

Kurt Froehlich and Emil Grieshaber, Milwaukee, Wis., assignors to Nordberg Manufacturing Company, Milwaukee, Wis., a corporation of Wisconsin

Application May 23, 1941, Serial No. 394,936

20 Claims. (Cl. 123—41)



11. In a reversible engine, the combination of a crankshaft; a camshaft for timing events in the engine cycle; a drive train between said shafts including a shiftable element which resists the reaction of the force exerted by the crank shaft to drive the camshaft and which when shifted full range changes the angular relation of said shafts and thereby reverses the timing of such events, the parts being so arranged that such force reaction urges said element toward that end of its motion range which establishes the direction of running; a reversing member shiftable full stroke between forward and reverse running positions, the range of said motion being at least as great as the maximum range of motion of said shiftable element; adjustable stop means which sustain said shiftable element against said force reaction and thus determine its position for each direction of running; and a yielding actuating connection between said reversing member and said shiftable element.

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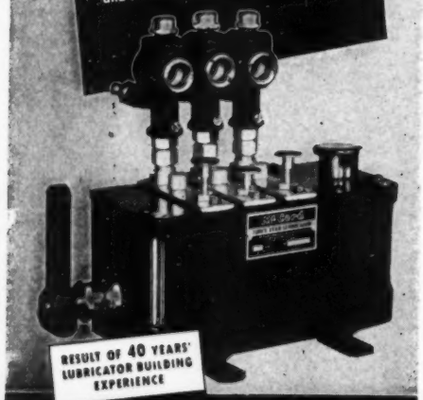

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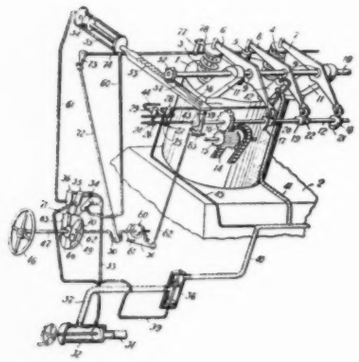
2,304,472

CONTROL MECHANISM FOR INTERNAL COMBUSTION ENGINES

Johannes Olsson, Goteborg, Sweden, assignor to Aktiebolaget Gotaverken, Goteborg, Sweden, a corporation of Sweden

Application April 23, 1941, Serial No. 390,005
In Sweden May 18, 1940
3 Claims. (Cl. 60—16)



1. In a reversible internal combustion engine, an operating gear capable of being set for operation of the engine ahead or reverse, respectively, a control member movable at will in two different turning directions from a neutral position, three pressure medium valves disposed adjacent said control member and connected with said operating gear, a cam on the control member capable of actuating one of said valves upon turning of the control member in one direction only from said neutral position thereby causing the operating gear to be set for operation of the engine ahead, a second cam on the control member capable of actuating another one of said valves upon turning of the control member in opposite direction only from said neutral position thereby causing the operating gear to be set for operation of the engine reverse, both cams being capable each per se to subsequently actuate said third pressure medium valve upon continued turning of the control member in the particular turning direction thereby causing compressed air to be supplied to starting air valves at the engine for starting the engine ahead or reverse, respectively.

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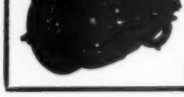

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Associate Engineer, Burns & McDonnell Engineering Co.
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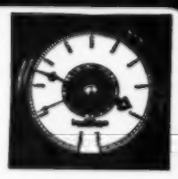

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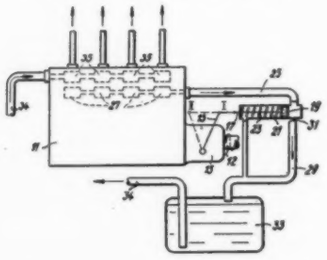
2,305,308

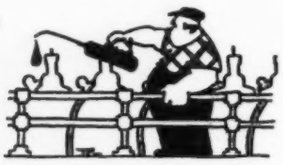
AUTOMATIC TIMING MECHANISM FOR FUEL INJECTION PUMPS

Hans Fischlmayr, Grafelfing, near Munich, Germany; vested in the Alien Property Custodian

Application June 8, 1940, Serial No. 339,531
In Germany February 17, 1939
13 Claims. (Cl. 123—140)



1. A fuel injection pump of the type by-passing a quantity of excess fuel at each cycle of operation and having adjustable timing means for varying the time of beginning a fuel injection cycle, characterized by the provision of a chamber for receiving the by-passed excess fuel, a restricted outlet for escape of fuel from said chamber so that an increase or decrease in the quantity of excess fuel delivered to said chamber per unit of time tends to produce respectively an increase or decrease in the fuel pressure within said chamber, means responsive to a change in pressure within said chamber for changing the adjustment of said timing means to advance the timing upon an increase in pressure and to retard the timing upon a decrease in pressure within said chamber, and a one-way check valve in the line of flow of excess fuel from said pump to said chamber, so that fuel may not be drawn backwardly from said chamber to said pump during a suction stroke of the pump.



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